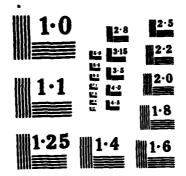
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NATIONAL BUREAU OF STANDARDS MICROCOPY RESOLUTION TEST CHART

Volume II

BCN 85-212-027-21-03

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INSTALLATION RESTORATION PROGRAM

PHASE II - CONFIRMATION/QUANTIFICATION

STAGE 2

APPENDICES

FOR

TINKER AFB, OKLAHOMA

AIR FORCE LOGISTICS COMMAND WRIGHT-PATTERSON AFB, OHIO

OCTOBER, 1985

PREPARED BY

RADIAN CORPORATION 8501 MO-PAC BOULEVARD POST OFFICE BOX 9948 AUSTIN, TEXAS 78766

CONTRACT NO. F33615-83-D-4001

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TECHNICAL SERVICES DIVISION (TS)

PREPARED FOR

UNITED STATES AIR FORCE
OCCUPATIONAL AND ENVIRONMENTAL HEALTH LABORATORY (OEHL)
BROOKS AIR FORCE BASE, TEXAS 78235

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APPENDIX A Definitions, etc.

The blank pages in this report were left blank intentionally per Mr. William Little, Radian Corporation.







APPENDIX A Definitions, Nomenclatures and Units

- AFB Air Force Base
- Aquifer geologic unit capable of storing and transmitting significant quantities of water.
- DOD Department of Defense
- EPA Environmental Protection Agency
- GC Gas Chromatography
- GC-MS Gas Chromatography-Mass Spectrometry
- Indurated rendered hard, as by heat, pressure or cementation
- IRP Installation Restoration Program
- mg/1 milligrams per liter
- POL Petroleum, oil and lubricants
- PVC Polyvinyl Chloride
- RCRA The Resource Conservation and Recovery Act
- RWDS Radiological Waste Disposal Site
- μg/L Micrograms per liter
- USAF United States Air Force



APPENDIX B
Scope of Work

INSTALLATION RESTORATION PROGRAM PHASE II, STAGE 2 FIELD INVESTIGATION TINKER AFB, OKLAHOMA

I. DESCRIPTION OF WORK

The purpose of this task is to determine if environmental contamination has resulted from solvent storage and waste disposal practices at Tinker AFB OK; to provide estimates of the magnitude, extent and direction of movement of contamination should contamination be found; to identify potential environmental consequences of migrating pollutants, and to identify future monitoring efforts required to document conditions at Tinker AFB.

Ambient air monitoring of hazardous and/or toxic material and Air Force personnel shall be accomplished when necessary, especially during drilling operations.

The presurvey report (mailed under separate cover) and Phase I IRP report (mailed under separate cover) incorporated background and description of the sites for this task. To accomplish this investigation, the contractor shall take the following actions:

A. General

- 1. All water samples collected shall be analyzed on site by the contractor for pH, temperature and specific conductance. Sampling, maximum holding time and preservation of samples shall strictly comply with the following references: Standard Methods for The Examination of Water and Wastewater, 15th Ed. (1980), pp. 35-42; ASTM, Part 31, pp. 76-86, (1980), Method D-3370; and Methods for Chemical Analysis of Waters and Wastes, EPA Manual 600/4-79-020, pp. xiii to xix (1979). Minimum detection limits and methods for analysis are shown in Attachment 1.
- 2. All wells installed during this effort shall be constructed of Schedule 40 PVC casing and screen. Each well shall be completed to ten feet below the level of the aquifer to be monitored, and ten feet of screen shall be set. Each well shall be provided with a surface grout seal, protective steel casing with locking cap and three guard posts placed radially away from the well.
- a. Shallow wells shall be installed into the first water bearing zone encountered (average depth, 30 feet). Well casing and screen shall be 2^m ID PVC; wells shall be installed using hollow-stem auger drilling techniques.
- b. Deep wells shall be installed into the first significant saturated sandstone body encountered (average depth, 100 feet). Well casing and screen shall be 4" ID PVC; wells shall be installed using air-rotary drilling techniques.
- c. Total footage of wells installed shall not exceed 1190 linear feet.
- 3. All contractor installed wells shall be developed, water levels measured and locations recorded on a project map and specific site maps. * Changes are underscored.

- 4. Field data collected for each site shall be plotted and mapped. The nature, magnitude and potential for contaminant flow within each zone to receiving streams and groundwaters shall be estimated. Upon completion of the sampling and analysis, the data shall be tabulated in the next R&D Status report as specified in Item VI.
- B. In addition to items delineated in A above, conduct the following specific actions at sites identified on Tinker AFB:

1. Buried Tanks and Pits (Bldg 3001)

- a. Inventory past and present industrial operations to locate any buried storage tanks or pits within a quarter-mile radius around Bldg 3001. To perform the inventory, the contractor shall:
 - (1) review available Air Force records;
- (2) interview appropriate Tinker Air Force Base personnel; and,
- (3) conduct a detailed surface inspection tour. No tanks or pits shall be entered or sampled.
- b. Provide the results of this inventory, with summary of findings and recommendations for future work, in the final report specified in Item VI.

2. Base Water Supply Wells

- a. Measure depth to water in each available (27) base water supply wells, after a shutdown of 2-4 days for equilibration. Wells shall be shutdown and measured in blocks; the shutdown shall be coordinated with the contractor, but shall be performed by Tinker AFB personnel (included in Base Support, Item III).
- b. Determine the elevation of the piezometric surface and the local direction(s) of groundwater flow in the regional aquifer based on the depth-to-water measurements. Provide the depth-to-water data in the next R&D status report as specified in Item VI.
- c. Compile an inventory of all public and private wells in the vicinity of the eastern boundary of Tinker AFB based on data available from the State of Oklahoma. The contractor shall obtain these data from the state. Water pumping rates and static depth to water, where available, shall also be used in the calculation specified in I.B.2(b) above.

3. Landfill Six

a. Install three shallow and four deep monitor wells in the vicinity of Landfill Six. The shallow wells shall be installed along the northern boundary of the base (below toe of landfill); the deep wells shall be installed around the private well located north of the landfill (information on private well provided under separate cover).

- b. Sample each well twice for Volatile Organic Halogens (14 analyses). Sample each well once for Volatile Organic Compounds (VOC) and Base/Neutrals and Acid Extractable (BNE) compounds (7 analyses each for VOC and BNE).
- c. Collect and analyze one groundwater sample from monitor well #2A south of Landfill 6. The water sample shall be analyzed for purgeable Halocarbons using EPA Method 601. The contractor shall use the detection limits as specified by the method.

4. Radioactive Waste Disposal Sites

Conduct a geophysical investigation, using a magnetometer or equivalent technique to determine the exact location of the radioactive waste disposed at sites (EWDS) 1022E and 62598. Site RWDS 62598 contains a "lead still" made of sheet lead and is located south of Facility 1025 and north of Crutcho Creek (See Attachment 2). Site RWDS 1022E contains approximately 8-10 lead pigs containing low-level radioactive materials and is located adjacent to the northwest corner of Landfill No.3 south of West Crutcho Creek (See Attachment 2).

5. Building 3001

- a. Install seven deep monitor wells in the vicinity of Bldg 3001 between the building and the eastern base boundary. Three wells shall be installed along East Drive; four wells shall be installed along Douglas Boulevard.
- b. Sample each well twice for Volatile Organic Halogens (14 analyses). Sample each well once for VOC and BNE compounds (7 analyses each).

6. Stream Sediment Study

- a. Collect stream sediment samples at 24 locations on Tinker AFB as shown in Attachment 2.
- b. Analyze the sediment samples for the parameters shown in Attachment 3.
- C. Set up and drilling at site Landfill Six shall not proceed until written authorization is forwarded to the contractor by the PCO or his/her representative. The reason for this is that appropriate Tinker AFB personnel are in the process of obtaining the required permit(s) to drill on this non Air Force Property.

D. Data Review

Results of sampling and analysis shall be tabulated and incorporated in the Informal Technical Information report (Sequence 3 Attachment 1, and Sequence 2 Attachment 3 as reflected in Item VI below) and forwarded to USAF OEHL/TS for review. Results shall also be forwarded as available in the next monthly R&D status report.

E. Reporting

- 1. A draft report delineating all findings of this field investigation shall be prepared and forwarded to the USAF OEHL as specified in Item VI below for Air Force review and comment. This report shall include a discussion of the regional hydrogeology; well logs of all project wells; data from water level surveys; water and stream sediment analysis results; well, pit and tank inventories; available geohydrologic cross sections; groundwater surface and gradient vector maps; and Laboratory quality assurance information. The report shall follow the USAF OEHL supplied format (mailed under separate cover).
- 2. Estimates shall be made of the magnitude, extent and direction of movement of contaminants discovered. Potential environmental consequences of discovered contamination, where known, must be identified.
- 3. Specific requirements, if any, for future groundwater and surface water monitoring must be identified.

F. Meetings

Two of the contractor's Senior personnel shall meet with Air Force and/or state, county or federal officials on two occasions for 16 hours each to present and discuss the results of this investigation. Meetings will be held at Tinker AFB, on dates to be established later.

II. SITE LOCATION AND DATES

Tinker AFB OK USAF Clinic/SGB Dates to be established

III. BASE SUPPORT: Tinker AFB will provide the following base support for these sites:

A. Buried Tanks and Pits

- 1. Provide relevant installation records and access to, or support of, reproduction services.
- 2. Schedule interviews with appropriate base personnel and provide escort for industrial areas.

B. Base Water Supply Wells

- 1. Schedule and execute 2-4 day shutdown of blocks of base water supply wells. This will incur minimal effect on base water supply.
- 2. Provide wellhead elevation data of each base water supply well. If data is not available, base will obtain such data by surveying.

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C. Landfill 6

1. Provide required surveying to determine relative elevations of monitor wells.

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2. Provide cuttings removal and drill site cleanup, including packaging when required.

D. Bldg 3001

- 1. Provide advance drill site clearance for selected locations.
- 2. Provide temporary construction barriers and parking/traffic control support for wells sited in parking lots and/or roadways.
- 3. Provide required surveying to determine relative elevations of monitor wells.
- 4. Provide cuttings removal and drill site cleanup, including packaging when required.
- IV. GOVERNMENT FURNISHED PROPERTY: None
- V. GOVERNMENT POINTS OF CONTACT
 - 1. Capt Robart Bauer
 USAF OEHL/TS
 Brooks AFB TX 78235
 (512) 536-2158
 AV 240-2158
- 2. Col Harry Russell
 HQ AFLC/SGPB
 Wright-Patterson AFB OH 45433
 (513) 257-6210
 AV 787-6210
- 3. Capt Darrel Cornell USAF Hospital/SGB Tinker AFB OK 73145 (405) 734-7844 AV 735-7844

VI. In addition to sequence numbers 1, 5 and 10 which are applicable to all orders, the reference numbers below are applicable to this order. Also shown are data applicable to this order.

Sequence No.	Block 10	Block 11	Block 12	Block 13	Block 14
Attachment 1					
4 3	ONE/R ONE/T	84 NOV 05	84 NOV 19	85 FEB 18	• 2
Attachment 3					
2	ONE/T	••	**		2

^{*}A minimum of two draft reports will be required. After incorporating Air Force comments concerning the first draft report, the contractor shall supply the USAF OEHL with a second draft report. The report shall be forwarded to the applicable regulatory agencies for their comments. Contractor shall supply the USAF OEHL with 25 copies of each draft report and 50 copies plus the original camera ready copy of the final report.

^{**}Upon completion of analysis.

Attachment 1

Analytical Methods and Required Detection Limits (For Water Unless Otherwise Shown)

Parameter	Method	Detection Limit
Arsenic	EPA 206.2 or 206.3	10 μg/L (1.0 μg/g, sediment)
Barium	EPA 208.2	200 μg/L (20 μg/g, sediment)
Cadmium	EPA 213.2	10 μg/L (1.0 μg/g, sediment)
Chromium	EPA 218.1	50 μg/L (5.0 μg/g, sediment)
Lead	EPA 239.2	20 μg/L (2.0 μg/g, sediment)
Mercury	EPA 245.1	1 μg/L (0.1 μg/g, sediment)
Selenium	EPA 270.3	10 μg/L (1.0 μg/g, sediment)
Silver	EPA 272.2	10 μg/L (1.0 μg/g, sediment)
Copper	EPA 220.1	20 μg/L (2.0 μg/g, sediment)
Zinc	EPA 289.1	50 μg/L (5.0 μg/g, sediment)
Maganese	EPA 243.1	50 μg/L (5.0 μg/g, sediment)
Nickel	EPA 249.1	100 μg/L (10 μg/g, sediment)
Fluoride	EPA 340.2	100 µg/L (10 µg/g, sediment)
Nitrate	EPA 353.2	100 µg/L (10 µg/g, sediment)
Cyanide	Standard 412	10 μg/L (1.0 μg/g, sediment)
Phenol	EPA 420.1	1 μg/L (1.0 μg/g, sediment)
PCBs	EPA 608	0.25 µg/L (1.0 µg/g, sediment)
Total Organic		
Carbon (TOC)	EPA 415.1	1000 μg/L (1000 μg/g, sediment)
Endrin	Standard 509A	0.02 µg/L (0.02 µg/g, sediment)
Lindane	Standard 509A	0.01 µg/L (0.01 µg/g, sediment)
Methoxychlor	Standard 509A	0.20 µg/L (0.20 µg/g, sediment)
Toxaphene	Standard 509A	1.00 µg/L (1.00 µg/g, sediment)
2,4-D	Standard 509B	0.06 µg/L (0.06 µg/g, sediment)
2,4,5-TP Silvex	Standard 509B	$0.06 \mu g/L (0.06 \mu g/g, sediment)$
Volatile Organic		
Halogens	EPA 601	•
Volatile Organic		
Compounds (VOC)	EPA 624	••
Base/Neutrals and Acid		
Extractable Compounds		
(BNE)	EPA 625	••

^{*}Detection limits for Volatile Organic Halogens shall be as specified for the compounds by EPA Method 601. Method: Federal Register, Vol. 44, No. 233, pp. 69468-69473. This method should be strictly followed including these items:

Item 1.4 - This method is recommended by EPA for use only by experienced residue analysts or under the close supervision of such qualified persons.

Item 2.2 - This is most important. If interferences are encountered (as in early peaks such as vinyl chloride), the method provides a secondary gas chromotographic column that will be helpful in resolving the compounds of interest from interferences. This must be done in the case of vinyl chloride and so noted in analysis report.

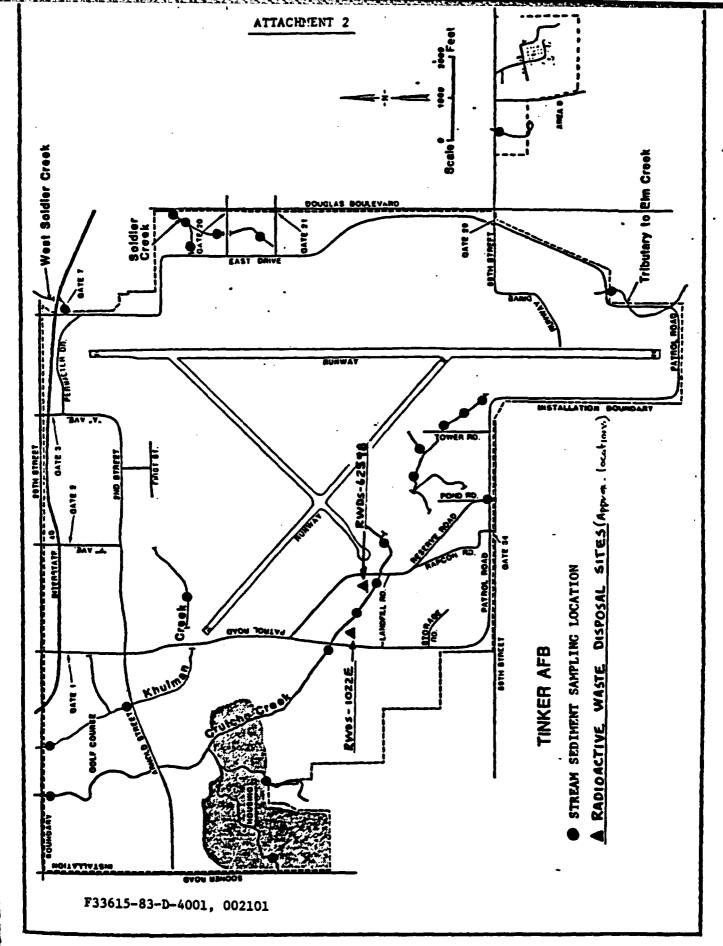
- Items 3.3, 7.1-7.3 These sections on interferences, contamination and QC should be strictly followed.
- Item 8.3 All samples must be analyzed within the recommended holding times.

 This must be followed without exception.

If questions are encountered about certain contaminants, you may be asked to show both chromatograms used to rule out possible interferences.

empetection limits for VOC and BNE compounds shall be as specified for the compounds by EPA Methods 624 and 625 respectively.

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B-11

Attachment 3

Analytic Parameters by Site

Number of Samples

Parameter	LF 6	Bldg 3001	QA	Total
Volatile Organic				
Halogens	14	14	3	31*
Volatile Organic				
Compounds (VOC)	7	7	2	16
Base/Neutrals and Acid				
Extractable Compounds	_	_		
(BNE)	7	7	2	16
	Stream	Sediment	QA	Total
Arsenic	2	4	3	27
Barium	2	4	3	27
Cadmium	2	4	3	27
Chromium	2		3	27
Lead	2	-	3	27
Mercury	2	-	3	27
Selenium	2	· *	3	27
Silver	2	•	3	27
Copper	2	•	3	27
Zinc	2 2		3 3	27 27
Maganese Nickel	2	= -	3	27 27
Fluoride	2	= = = = = = = = = = = = = = = = = = = =	3	27
Nitrate	2		3	27
Cyanide	2	•	3	27
Pheno1	2		3	27
PCB's	2	-	3	27
Total Organic	_	•	•	-
Carbon (TOC)	2	4	3	27
Endria	2	4	3	27
Lindane	2	4	3	27
Methoxychlor	2	-	3	27
Toxaphene	2		3	27
2,4-D		4	3	27
2,4,5-TP Silvez	2	4	3	27

*Since each sample for Volatile Organic Halogens shall be analyzed twice (see method footnote item 2.2 in Atch 1), the contractor shall price 62 analyses by EPA method 601



APPENDIX C Well Numbering System

The wells drilled for the Tinker Air Force Base Installation Restoration Program, Phase II Stage 2, were designated by Zone Number and sequential letters within zones. This nomenclature is an extension of that used in the Stage 1 investigation. Designators were assigned in the order in which the drilling locations were established. Zone 6 applies to the Building 3001 Investigation. Zone 7 applies to the Landfill 7 investigation. Table C-1 contains a list of all wells and cores for the project, listed by zone of investigation.



TABLE C-1. LIST OF WELLS

Building 3001 Area

Landfill 6

Well	6A 6B 6C 6D		6E 6F 6G	

Well 7A Well 7E (not completed)
7B 7F
7C 7G
7D



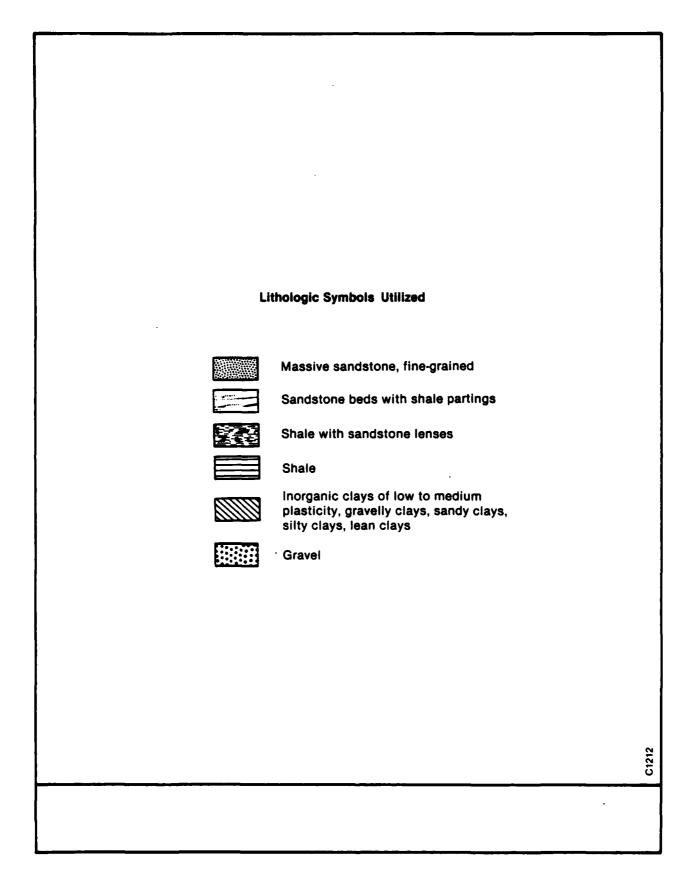
APPENDIX D

Well Logs

This Appendix contains the logs of drilling and well completion activities for the project. Table C-l (Appendix C) containes a list of all wells and cores for the project, listed by zone of investigation.



Logs of Drilling Operations



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Sheet ___1 __ of ___3

Log of Drilling Operations

Boring or Well No. 6A Location East Drive, north of Bradley Drive Log Recorded By W.M. Little

Project Tinker AFB IRP Phase II Stage 2

Beginning 26 June 1984 and end
26 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

				· _	Jim Winnek, Inc.
Depth (ft)	Graphic	ID No. of Sampte Taken	Type of Sample Taken	Stratigraphy	Remarks
	VIIII	None	grab	Gravelly clay fill.	
		j	from	CLAY, red-brown.	
!		}	cutting	Б	
l -		}		CLAY, dark brown, damp, becoming	
5—		1		drier with depth, completely dry	
 -		1		by 6'.	
 			<u> </u>	·	
1 F					
10				SAND, red, fine, dry.	
1 10 —					
1 E					}
15—					
1 - F					
-					
 -					
 -					
20				SHALE, red-brown, sandy, friable.	Very hard drilling
	W00000000000			SHALE, red-brown, sandy, rrrable.	minor water at 22',
					dry below, continu-
					ous drilling.
25		1			
		1			
1 -		1			
-					
 -		1			
30			[
 -					
 					
		1	1		
35					
IT			1		
I]	SAND, red-brown, fine.	
<u> </u>		1		D-7	
40		3	j l		l

		DI		
K	-	الا	24	

Sheet ___2 of ___3

Log of Drilling Operations

Boring or Well No. 6A

Location East Drive, north of Bradley Drive

Log Recorded By W.M. Little

Project Tinker AFB IRP Phase II Stage 2

Beginning 26 June 1984 and end

26 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40					
45					
E				SAND, brown, fine.	
50				SHALE, brown, grey mottle, dry.	
55					
<u> </u>					
60				SAND, red-brown, fine, dry.	
-					
65				GRAVEL, red-brown, fine, silt,	·
-				Sand, water returns.	
70					
75					
 					
80				D-8	

RADI	AN		_		Sheet 3 of 3				
Log of Drilling Operations									
Boring or We	ell No. <u> </u>	SA	_	Project Tinker AFB IRP 1					
Location E			h of Bra	dlev Drive Beginning 26 June 2984	and end of drilling operation				
Log Necorde	,u by			Sampling Interval (Estimate	d) variable (ft)				
				Type Drill Rig and Operator	Failing 1250 Jim Winnek, Inc.				
	<u>i</u>	e c	7 9 c						
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks				
80				Same materials. TD = 82'.					
85 🛨			,						
-									
90	: :								
95									
100			: 						
<u>-</u>									
105									
110									
-		İ							

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Sheet 1 of 3

Log of Drilling Operations

Boring or Well No. 6B

Location East Drive, south of Bradley Drive

Log Recorded By W.M. Little

Project Tinker AFB IRP Phase II Stage 2

Beginning 27 June 1984 and end
27 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

				<u> </u>	Jim Winnek, Inc.
Depth (ft)	Graphic	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
		None	grab from	CLAY, brown, plastic (fill).	
			cutting	s CLAY, red-brown.	
5					
1 -		}		CLAY, brown.	
10				CLAY, grey-brown, plastic.	
15			:	CLAY, red-brown, sandy, dry.	
20-				CLAY, mixed red-brown and brown- black, plastic, damp, minor sand	
				CLAY, brown, sandy.	
25					
30-					
35				SAND, red-brown, fine, silty, dry.	
40			:	D-11	· -

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Sheet 2 of 3

Log of Drilling Operations

Boring or Well No. 6B

Location East Drive, south of Bradley Drive

Log Recorded By W.M. Little

Project Tinker AFB IRP Phase II Stage 2

Beginning 27 June 1984 and end
27 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

	Jim Winnek, Inc.						
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks		
40				SANDY CLAY, red-brown.	Thin clay layers 40-42'.		
45 —							
50							
55 —				SAND, red-brown, fine, little			
E				clay. Same, lighter color.			
60 —							
65				Same, damp.			
70							
					·		
75			:	Same, moist.	Driller reports beginning of water production.		
1 . F				D-12			

RADIAN				of D-:!!!	Sheet3_ of3					
Boring or We Location <u>Ea</u> Log Recorde	st Drive	south.	of Brad	ley Drive		of drilling operation nated) variable (ft)				
					·	Jim Winnek, Inc.				
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken		Stratigraphy	Remarks				
85 ————————————————————————————————————				Same mate	erials. TD = 90'.					
115				1	D - 13	7-03-13718				

			_
RA		A)	V.
KH	وري		•
			•

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Sheet 1 of 3

Log of Drilling Operations

Boring or Well No6C	•	
Location East Drive at Entry	Road A	
Los Boorded By W.M. Little		

Project Tinker AFB IRP Phase II Stage 2

Beginning 27 June 1984 and end

28 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

				· <u> </u>	Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
		none	grab	CLAY, brown, with gravel (fill).	
 			from cuttings		
 		Í			
5					1
		1		CLAY, dark brown, sandy.	
-			ļ 1	SANDSTONE, light brown, hard, dry.	ļ
-	11111			SANDY CLAY, red-brown, increasing	
10				sand with depth.	
<u> </u>		{	·		
-					
				SAND, red-brown, some clay.	
15				5.1.2, 102 510 m, 1020 122, 1	
-					
-					
20					
-				CLAY, red-brown, moist, friable, some sand, drier with depth.	Minor water at ∿20', dry below, continuous
		1		Some Sana, arrer with deposit	drilling.
		1			
25		1			
 		3			
		}			
<u> </u>		3	1		
30—		4	•		
		1		SAND, red-brown, fine, dry.	1
_ -					
35					
]	D-15	
40					
70.	2012/06/2016	4	<u> </u>	January and the second of the	de la companya da la companya da sensa

RA	DI	A	N
		_	

Sheet _____ of ____ 3

Log of Drilling Operations

Boring or Well No. 6C	Project Tinker AFB IRP Phase II Stage 2
Location <u>East Drive at Entry Road A</u> Log Recorded By <u>W.M. Little</u>	•
	Sampling Interval (Estimated) variable (ft)
	Type Drill Rig and Operator Failing 1250

				·	Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40				No discharge.	
				No discharge.	
45					
l "F					
			}		
50					
				SAND, red-brown, fine, some clay.	
55 —					
				SAND, red-brown, fine.	
l F					
60					
-			 	No change.	Shale streak at 63'.
					·
65			ŀ		·
-			j		
70					Begin water production.
-					
75				SAND, red-brown, fine, silt, some water.	Scant returns.
F				warer.	
				D-16	
i an i	F error	1	[

RADI	AN				Sheet <u>3</u> of <u>3</u>
CORPORATION	A		Log	of Drilling Operations	
Boring or We	ell No. <u>6</u>	C	<u> </u>	Project Tinker AFB IRP I	Phase II Stage 2
Location Ea	st Drive	at Enti		A Beginning 27 June 198	and end
Log Recorde	id By			Sampling Interval (Estimate	of drilling operation d) variable (ft)
				Type Drill Rig and Operator	
	υ				Jim withter, inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
80					
		1		SAND, red-brown, medium.	
		'			
85					
				SANDSTONE, red-brown, friable.	Hard drilling.
90 +				TD = 90'.	
		1			
95					
,					
Ļ			•		
1,00					
100	•				·
 	Ì	•			
105		l			
			1		
110					1
-		•			
		1			
115					
	f	(f /	•	1

D-17

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Sheet 1 of 2

Log of Drilling Operations

Boring or Well No.	6D			•	Project _	Tinke	r AF	B IRP	Phas	e II St	age 2	
Location Douglas	Blvd. north	of	Bradley								and en	d
Log Recorded By _			19 June 1984			of drilling operation		n				
					Sampling I	g Inter	val (E	stima	ted) <u> </u>	ariable	<u> </u>	t)
					Type Dril	ll Ria :	and O	perato	or Fai	ling 12	250	_
					.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					Winnek		

Depti (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
		none	grab from cutting	CLAY, dark red-brown, with gravel (fill).	
5				CLAY, red-brown, minor sand. SHALE, weathered, red-brown, friable, minor sand.	
15				SHALE, red-brown.	
20				SAND, fine, red-brown.	
25	-				
30-	-				
35				SAND, fine, red-brown, thin clay layers.	Harder drilling.
		_		D-19	

RADI	AN				Sheet2_ of2				
	Log of Drilling Operations								
Boring or We			th of B	Project <u>Tinker AFB IRP P</u> radley Drive Beginning19 June					
Log Recorde				19 June 1984 Sampling Interval (Estimated	of drilling operation				
				Type Drill Rig and Operator	Failing 1250				
	O	<u>-</u>			Jim Winnek, Inc.				
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks				
1.1.1				SAND, fine, red-brown, fines.	Begin water production.				
45 —				SHALE, red-brown. SAND, medium, fine gravel, fines.	Reduced water pro- duction. Water production				
50					^1 gpm or less.				
55 —				Same materials. TD = 57'.					
60									
65									
70									

D-20

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	_

Sheet 1 of 3

Log of Drilling Operations

Boring or Well No. 6E Project Tinker AF
Location Douglas Blvd. & Entry Road A Beginning 19
Log Recorded By W.M. Little 19 Ju

Project Tinker AFB IRP Phase II Stage 2

Beginning 19 June 1984 and end

19 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

			· · · · · <u>-</u> · · · ·		Jim Winnek, Inc.
Depth (ft)	Graphic	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
111		none	grab from cuttings	CLAY, red-brown, sandy, with mixed gravel (fill). Same, no gravel.	
5—					
10				SHALE, weathered, red-gray, minor sand, changing to red-brown with depth.	
15—				SHALE, sandy, red-brown, friable, increasing sand with depth. SAND, fine, friable red-brown, minor fines.	
20-				minor fines.	
25					
				SHALE, red-brown.	
30					
35				SAND, fine, friable, red-brown, minor fines. SHALE, red-brown, with grey	
40				mottling. D-21	

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Sheet ____2 __ of ____3

Log of Drilling Operations

Boring or Well No. 6E	Project Tinker AFB IRP Phase II Stage 2
Location Douglas Blvd. & Entry Road A	Beginning 19 June 1984 and end
Log Recorded By <u>W.M. Little</u>	19 June 1984 of drilling operation
	Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

Jim Winnek, Inc.

L						·	Jim Winnek, Inc.
Depth (ft)		Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks	
Γ	40					SAND, fine, tan/pink, clean.	
		_				SAND, fine, red-brown.	
	45 —						
ļ		Ĺ					
		E					
	50						
l		-					
Ì		 					
-	55 —						
l		E					
	60 —	-					60.701
	00 —	F					Scant returns 60-70'; add ∿80 gals. water
Ì		F					to clean hole, lift cuttings.
ł	65 _	Ė					
		E					
Ì		_					
	70 -	F				SAND, medium, red-brown, with fine	
ļ		F				gravel and fines.	
]
	75						
	หับ	F				D-22	

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Sheet __3__ of __

Log of Drilling Operations

Boring or Well No. _ Location Douglas Blvd. & Entry Road A Log Recorded By _

Project Tinker AFB IRP Phase II Stage 2 19 June 1984 Beginning_ 19 June 1984 of drilling operation Sampling Interval (Estimated) variable Type Drill Rig and Operator Failing 1250

Jim	Winnek,	Inc.
-----	---------	------

					Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
80				Same materials, more indurated.	Harder drilling, driller reports minor water.
85 —					
90			ļ		
95 —					
100				Same materials.	Scant returns, water in hole when change rods.
105			·		
110					Water production ∿1 gpm.
115				Same materials. TD = 115'.	Water production 3-5 gpm.
120				D-23	

BADI	AN			_		Sheet1 of3		
Log of Drilling Operations								
Boring or Well No. 6F Project Tinker AFB IRP Phase II Stage 2								
Location_D	PDO Yard				Beginning 20 June 1	984 and end		
Log Recorde			1e		20 June 198	21.0 01.0		
Log necord					Sampling Interval (Estimate	d) variable (ft)		
Type Drill Rig and Operator Failing 1250								
						Jim Winnek, Inc.		
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken		Stratigraphy	Remarks		
0		none	grab	SHALE.	weathered, red-brown.			
			from	JIMDD,	weathered, red brown.			
			cutting	5				
5								
				SHALE, g				
! [1		ORALE, I	ed-brown.	4		
	9////////////			CAND S'	no wod_bworm wi-ow oil+	}		
l [SAND, 11	ne, red-brown, minor silt.			
10				SHALE, p	ink, turning red-brown	Hard drilling, high		
L					th, very dry.	dust.		
1 L						1		
-			ļ					
 -		1	1					
15—		1	1]		
l ⊢		1	-	l				
\		1	1	ŀ				
-		1	į.	Ì				
l		1						
20		1						
1 F		1						
 -		1		CAND 64=	a -ink/tan			
 -				SAND, IIN	e, pink/tan.			
] ₂₅								
25			}	1				
		3	1	CANDA GAY	LE, red-brown, some thin			
		3		hard stre				
30—		3	1					
1 " L								
ı [3						
		3	1					
-		}	1					
35		1						
I		3]				
 -								
1 -		3]	D-25			

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2__of___ Sheet ___

Log of Drilling Operations

Boring or Well No. 6F	Project Ti	lnker	AFB	IRP	P
Location DPDO Yard	Beginning	_20	June	198	4
Log Recorded By W.M. Little		20 J			_
	_	_			

hase II Stage 2 and end of drilling operation Sampling Interval (Estimated) variable Type Drill Rig and Operator Failing 1250

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40					
45 —				·	
 - -	000400000000000000000000000000000000000			SAND, medium, red-brown.	
50					
F				SAND, medium, red-brown, with fine gravel.	
55 —				SAND, fine, tan/yellow. SAND, fine, brown, with shale pebbl SANDSTONE, grey, hard.	es.
)	SHALE, red-brown.	
60 —					
65					
-					
70 —				SAND, fine, red-brown.	
		:			
75					
			·	D-26	

					Sheet3 of3_					
RADI	Log of Drilling Operations									
Boring or W Location <u>Di</u> Log Record	PDO Yard		.	Beginning 20 June	1984 and end 1984 of drilling operation ated) variable (ft)					
Depth (ft)	Graphi. Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks					
85 — 85 — 90 — 95 — 910 — 9110 — 9115				SAND, fine, red-brown, soft. SANDSTONE, hard. Same materials. TD = 102'.	Sand collapse, add water to clean hole. Scant returns.					
120				ν-2 <i>1</i>	7.43					

RAD	IAN		Log	of Drilling Operations	Sheet1of3_				
Boring or V Location_ <u>i</u> Log Record	lest of B	1dg. 311	7	Project Tinker AFB IRP I Beginning Sampling Interval (Estimate	- Project Tinker AFB IRP Phase II Stage 2				
Depth (ft)	Graphic	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks				
5		none	grab from cuttings	SHALE, red-brown. SAND, fine, red-brown, minor silt.					
25				SILTY SAND, red-brown, partially wetted from up-hole poor returns.	Mud on bit, minor water, dry below, continue drilling.				

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RADI	RADIAN Log of Drilling Operations Sheet 2 of 3 Log of Drilling Operations								
Boring or W Location <u>W</u> Log Record	est of B	Sampling Interval (Estimate Type Drill Rig and Operator	and end of drilling operation d) variable (ft)						
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks				
45				No change. Shale streak.	Nama dust 11 san				
50				Shale streak.	Hard drilling.				
55 —				Shale streak.	Hard drilling.				
65				SANDY CLAY, red-brown, damp. Shale streak.	Hard drilling.				
70 —									

SAND, red-brown, fine scant

returns.

RADI	AN		<u> </u>		Sheet <u>3</u> of <u>3</u>				
Log of Drilling Operations									
Boring or We	II No. 6G	d= 2117	,		Project Tinker AFB IRP Phase II Stage 2				
Location wes					of drilling operation				
				Sampling Interval (Estimate Type Drill Rig and Operator	d) <u>variable</u> (ft) Failing 1250				
				- Type Dim ring and Operator	Jim Winnek, Inc.				
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks				
-									
85				Shale streak.	Hard drilling. Begin water production.				
90				Same materials. TD = 90'.					
95									
100									
105									
110									
115									

RADIAN	
CORROCATION	

Sheet __1__ of __3_

Log of Drilling Operations

Boring or	Well No.	7A						^~
Location	Adjacen	t (no	rth)	of	SE	59th	St.	
Log Reco	rded By _	L.N.	Fren	ich			·	

Project Tinker AFB IRP Phase II Stage 2

Beginning 11 July 1984 and end 11 July 1984 of drilling operation Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

ļ					Jim Winner, inc.	
Graphic Log		ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks	
5	- - -		none	grab from cuttings	CLAY-FILL, dark brown-red, organic fragments, silty sand; grades to sandstone. SHALE, red-brown, plastic, weathered appearance.	Soil probably represents highway fill. Drilling performed with 7-7/8" diameter tricone bit.
10	- - - -				SANDSTONE, fine-grained, red- orange, friable.	Cuttings damp at 11'; minor water produced to 20'.
15	- - - -					·
25—	- - - -				SANDSTONE/SHALE (gradational contact with above sandstone), interbedded red-orange sandstone and shale, saturated.	Much water blown from hole at 22'.
30-	- - -					•
35	- - -				D-33	Rig vibrates at 35'.

Sheet 2 of 3

Log of Drilling Operations

Boring or Well No. 7A	Project Tinker AFB IRP Phase II Stage 2
Location Adjacent (north) of SE 59th St.	Beginning 11 July 1984 and end
Log Recorded By L.N. French	11 July 1984 of drilling operation
	Sampling Interval (Estimated) variable (ft)
	Type Drill Rig and Operator Failing 1250

				_ <u></u>	Jim Winnek, Inc.
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
40					No water produced at 42' after adding drill rod.
45					
50					Harder and slower drilling at 47'; increasing water production below 49'.
55 —				SANDSTONE, fine-medium grained, orange, friable, slightly moist.	Easy drilling below 55'.
60					
65					Hole caved slightly at 62'.
70 -				Sandstone is dry.	
75					
80				D-34	

RADI	AN		Log	of Drilling Operations	Sheet <u>3</u> of <u>3</u>
Boring or We Location Ad Log Recorde	jacent ((north) (of SE 59	Project Tinker AFB IRP Beginning 11 July 198 Sampling Interval (Estimat Type Drill Rig and Operato	of drilling operation of variable (ft)
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
85 —				SANDSTONE with few mottled shale fragments, trace gravel.	Few cuttings returned below 84'. Water produced at 88'; dry at 93'.
100				End of boring-110'.	Rig vibrates at 108-109'.

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Sheet 1 of 2

Log of Drilling Operations

Boring or Well No. 7B	*	Project Tinker AFB IRP Phase II Stage 2
Location North of SE 59th St.		Regioning 10 July 1984 and end
Log Recorded By L.N. French	_	11 July 1984 of drilling operation
,		Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

Jim Winnek, Inc.

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
5		none	grab from cuttings	SANDSTONE, fine to medium grained, red-brown, friable, slightly moist, lenses and layers of SHALE,	Drilling performed with 7-7/8" diameter tricone bit.
10				red-brown, mottled, plastic.	
15					
20					
25 —				SHALE, red-brown, moist, plastic; with thin sand laminae. Shale is interbedded with fine-grained, orange sandstone.	
30-				SANDSTONE, fine to medium grained, red-brown, friable.	Driller notes damp conditions, few cut- tings returned to
35				Moist; interbedded with SHALE, red- brown, mottled, plastic.	surface.
				D-37	

Location N	Well No orth of S ded By _L.	E 59th 9	St.	Project Tinker AFB IRP Beginning 10 July 11 July	Phase II Stage 2 1984 and end 1984 of drilling operation
				Sampling Interval (Estimat Type Drill Rig and Operato	ed) <u>variable</u> (ft)
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
45				End of boring - 45'.	Drilling suspended; much water blown fro hole.
50					
55					
65					
70 —					
75					

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Sheet __1__ of __3_

Log of Drilling Operations

Boring or Well No. 7C

Location North of SE 59th St.

Log Recorded By L.N. French

Project Tinker AFB IRP Phase II Stage 2

Beginning 10 July 1984 and end 10 July 1984 of drilling operation Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

Depth (ff)	nc.
from cuttings ture, dry. Grades to orange-red color below 3'. Thin sandy soil (less than 1') at surface. Thin layers/lenses of SHALE, red, plastic; between 9-11'. Indurated sandstone, white at 15'. Harder drilling SHALE, red-brown, plastic, slightly moist, few lenses or layers of fine-med. grained sandstone (in-	3
Indurated sandstone, white at 15'. Harder drilling SHALE, red-brown, plastic, slightly 15', 18'. moist, few lenses or layers of fine-med. grained sandstone (in-	ormed Lameter
SHALE, red-brown, plastic, slightly 15', 18'. moist, few lenses or layers of fine-med. grained sandstone (in-	
duraced 20the at 10 /.	ng at
20-	
25—	
30	
SANDSTONE, fine-medium grained, Rig vibrates at slightly indurated, slightly moist D-39	it 34'.

RADI	AN		1 00	g of Drilling Operations	Sheet 2 of 3
Boring or We Location No: Log Recorded	rth of S	SE 59th	St.	Project Tinker AFB IRP P Beginning 10 July 1984 10 July 1984 Sampling Interval (Estimated Type Drill Rig and Operator)	and endof drilling operation d) variable (ft)
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
45 ————————————————————————————————————				Increasing moisture at 42', few cuttings returned. Decreasing moisture, increasing silt content, few thin shale layers. Sandstone is orange, no silt, friable. SHALE, red-brown, plastic, slightly moist; some sandstone lenses and layers in shale matrix.	
- - - -				SANDSTONE, fine to medium grained, trace shale fragments, red-brown.	Rig vibrates at 77°.

Few cuttings returned to surface.

D-40

RADI	AN		Log	of Drilling Operations	Sheet 3 of 3
Boring or W Location <u>No</u> Log Recorde	orth of S	SE 59th.	St.		284 and end 284 of drilling operation 284 variable (ft)
Depth (ft)	Graphic Log	iD No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
85 — 85 — 90 — 9100 — 100 — 110 — 1115 — 111				Sandstone mixed with shale fragments. End of boring - 102'.	Rig vibrates at 88'. Water blown from hole after pause in drilling; drilling to 102' yielded very few cuttings.
120				D-41	7.83.13718

RADIAN	
CORPORATION	

Sheet	1	of.	2

Log of Drilling Operations

Graphic Control Contro		Stratigraphy	Remarks		
(ft)	Gra		l		nemarks
-		none	grab from	Clay-loam soil, brown.	
_			cuttings	Sandy clay, red-brown.	
5				• •	
⁷ 干					
				Shale, red-brown, weathered.	
10			<u> </u>		
下					
				Shale, red-brown, slight to no	
15—				weathering.	
-			<u> </u>		
20				Sand, red-brown, fine, some silt.	
				Cand wad/tan fine honomine wad-	
F				Sand, red/tan, fine, becoming red- brown by 24'.	
25					
<u> </u>					
F					
30					
E					
F					
35					
L .					
F				No change. D-43	
40				no change. D-43	

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-			-		

Sheet __2 _ of ___2

Log of Drilling Operations

Boring or Well No. 7D

Location West edge of Landfill 6

Log Recorded By W.M. Little

Project Tinker AFB IRP Phase II Stage 2

Beginning 28 June 1984 and end

28 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

L						Jim winner, Inc.
	1		Type of Sample Taken	Stratigraphy	Remarks	
Γ	40				No change.	
	45 —				Shale streak.	Hard drilling, 4".
	50				Same materials, slight moisture.	
	55				Shale streak. Sandy clay, red-brown, moist.	Hard drilling, 2".
	60				No change.	Little water production.
	65					
	70 -					
	75				Same materials. TD - 75'.	
	80				D-44	

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Sheet 1 of 2

Log of Drilling Operations

Boring or Well No. 7E	- Project Tinker AFB IRP Phase II Stage 2
Location North edge of Landfill 6	Beginning 21 June 1984 and end
Log Recorded By W.M. Little	of drilling operation
	Sampling Interval (Estimated) variable (ft
	Type Drill Rig and Operator Failing 1250

					olm withick, the.
Depth (ft)	Graphic	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
		none	grab from cutting	Clay, red-brown, plastic.	
5			SS grab from cutting:	Clay, grey, sandy. Clay, red, mottled w/grey, firm, sa Shale, weathered, red-brown. Sand, fine, red-brown, damp.	ndy. Spoon refusal at 6'.
10					;
15				Sand, red-brown, fine, many fines.	
20					Negative Draeger hydrocarbon, poly-
25					test.
30				Sand, red-brown, sandstone gran- ules, damp.	
35				·	Harder drilling.
40 -				D-45	

RADI	AN				Sheet 2 of 2				
Log of Drilling Operations									
Boring or We	ell No	Ε		Project Tinker AFB IRP 1	Project Tinker AFB IRP Phase II Stage 2				
Location No Log Records					1984 and end of drilling operation				
				Sampling Interval (Estimate	ed) <u>variable</u> (ft)				
				Type Drill Rig and Operator	Jim Winnek, Inc.				
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks				
45 —		:							
50									
55 —				Sand, red-brown, fine, becoming darker with depth.					
60				Same materials. TD = 60', no water encountered.	Hole dry 6/22/84. Abandon by grouting.				
65									
70 -									
75 —				D-46		7.83-13718			
80		ļ	l		<u> </u>	7.8			

RA	DI	AN	
CORRO			

Sheet ____1 of ___1

Log of Drilling Operations

Boring or Well No. 7F

Location North edge of Landfill 6

Log Recorded By W.M. Little

Project Tinker AFB IRP Phase II Stage 2

Beginning 22 June 1984 and end

22 June 1984 of drilling operation

Sampling Interval (Estimated) variable (ft)

Type Drill Rig and Operator Failing 1250

Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
-		none	grab from cuttings	Sand, red-brown, fine, silty.	
5			 B	Sand, red-brown, fine, less silt.	
10					
15				Sand, brown, damp.	
20-				Clay, brown, sandy.	Mud on bit at 20', 22 gals. water in hole when resume drilling.
25				Same materials. TD = 25'.	Small water production.
30					
35					718
40				D~47	7.83.13718

RADI	AN		Log	of Drilling Operations	Sheet 1 of 1
Boring or W Location <u>Ea</u> Log Record	ast edge	of Land	fill 6		84 and end of drilling operation d) variable (ft)
Depth (ft)	Graphic Log	ID No. of Sample Taken	Type of Sample Taken	Stratigraphy	Remarks
5—- - - - - - - - - - - - - - - - - - -		none	grab from cuttings	Sand, red-brown, fine, silty, damp. Sand, red-brown, fine, damp.	Negative Draeger hydrocarbon.
20				Clay, brown, moist. Gravel, fine, silty and sandy. Same materials. TD = 30'.	Heavy water production.

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Well Completion Logs



TABLE D-1. SPECIFICATION SHEET FOR GRAVEL PACK USED

	Typical	Grading	Effective	Effective Size (mm)			
Screen	Average	Range	Average	Range	Coefficient		
6	0%	0	1.25	1.18-1.30	1.53		
8	3.7%	2.1-5.1					
10	22.9%	18.0-25.6					
12	51.4%	45.6-62.3					
14	72.8%	66.5-79.0					
16	94.6%	89.9-99.4					
20	98.4%	96.0-99.9					
25	98.6%	96.5-99.9					

RA	DI	A	N
C0440		-	

Well Completion Log: Sheet 1/2

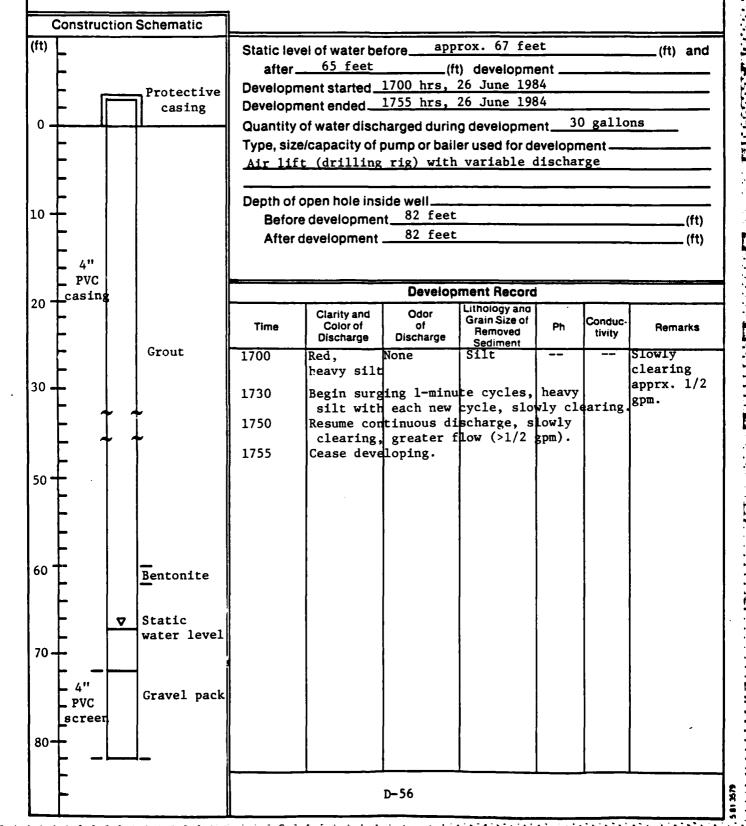
Boring or Well No. 6A Location East Drive, north of Bradley Drive	Project Tinker AFB IRP Phase II Stage 2 Log Recorded By W.M. Little
Construction started 26 June 1984	completed 26 June 1984
Development started 26 June 1984	completed <u>26 June 1984</u>
Total depth drilled (ft) 82 feet.	
0 4 - a b	
Drilling method air rotary	
Problems encountered during drilling None	
Water source for drilling and completion procedure	s base supply
	mples from discharge
Sample interval (ft-ft) variable Storage method(s) plastic bags, ambient	temperature
Storage method(s) plastic bags, ambient	temperature
Casing type Schedule 40 PVC, flush joint Depth of casing (ft) 72 feet	Diameter 4 Inches
Screen type Schedule 40, PVC, mill slot Slot size 0.020 inches Sc	
Type(s) of glue used to join casing none	
Type of gravel pack used 8-12 sand	
Amount of gravel pack usedsee_next_page	
Grain size distribution of gravel pack see specif	ication sheet
Lithology of gravel pack Quartz, trace rock fr	ragments
Source (company and quarry/pit) Arkhola Sand	& Gravel, Ft. Smith, AR
Interval of gravel pack (ft-ft)62-82 feet	
Interval of bentonite seal (ft-ft) 60-62 feet	
Interval of grouting (ft-ft) 0-60 feet	
Description of security measures 8 inch steel p	protective casing and lid; secured with padlock
Padlock ID No. Master 3213	Location of key(s) TAFB/SGB, DEEP; Radian

RADIAN

Well Completion Log: Sheet 2/2

Boring or Well No. 6A Project Tinker AFB IRP Phase II Stage 2

Location East Drive, north of Bradley Drive Log Recorded By W.M. Little



Well Completion Log: Sheet 1/2

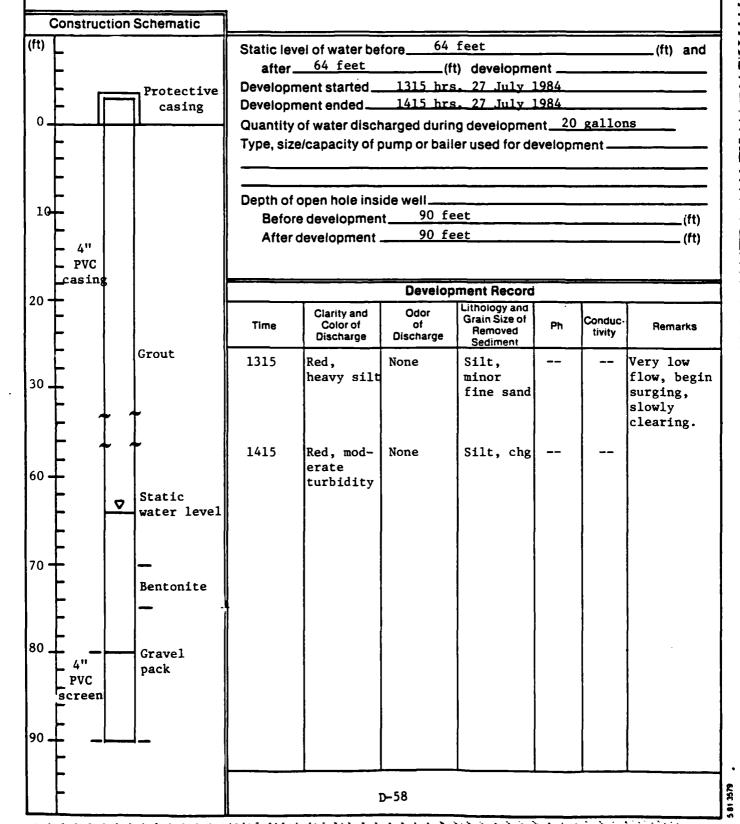
Boring or Well No. 6B Location East Dr., South of Bradley Drive	Project Tinker AFB IRP Phase II Stage 2 Log Recorded By W.M. Little
Construction started 27 June 1984 Development started 27 June 1984	completed 27 June 1984 completed 27 June 1984
Development started 27 June 1984	completed 27 June 1984
Total depth drilled (ft) 90 feet	
2 4 male	
Drilling methodair_rotary	
Problems encountered during drilling None	
Water source for drilling and completion procedures Number and type of samples collected Grab_sam	ples from discharge
Sample interval (ft-ft) variable Storage method(s) plastic bags, ambient	temperature
Storage method(s) plastic bags, ambient	cemperature
Casing type Schedule 40 PVC, flush joint Depth of casing (ft) 80 feet Screen type Schedule 40, PVC, mill slot	
Slot size 0.020 inches Sc	
Type(s) of glue used to join casing none	
Type of gravel pack used 8-12 sand	
Amount of gravel pack used see next page	I and a characteristic for the control of the contr
Grain size distribution of gravel pack see specif	ication sneet
Lithology of gravel pack Quartz, trace rock fr	
Source (company and quarry/pit) Arkhola Sand	d Graver, Ft. Smith, Ak
Interval of gravel pack (ft-ft) 75-90 feet	
Interval of bentonite seal (ft-ft)	
Interval of grouting (ft-ft) 0-70 feet	
	rotective casing and lid; secured with padlock
Padlock ID No. Master 3213	Location of key(s) TAFB/SGB, DEEP; Radian

R	A	D	1	A	N	I
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Well Completion Log: Sheet 2/2

Boring or Well No. 6B Project Tinker AFB IRP Phase II Stage 2

Location East Drive south of Bradley Drive Log Recorded By W.M. Little



Well Completion Log: Sheet 1/2

Boring or Well No. 6C	Project Tinker AFB IRP Phase II Stage 2			
Location East Drive at Entry Road A	Log Recorded By W.M. Little			
Construction started 27 June 1984	completed 28 June 1984			
Development started28 June 1984	completed 28 June 1984			
	completed			
Total depth drilled (ft) 90 feet				
Drilling method air rotary				
Problems encountered during drilling none				
Water source for drilling and completion procedure	s base supply			
Const. and	-les from dischange			
Number and type of samples collected. Grab sam	mples from discharge			
Sample interval (ft-ft) variable				
Storage method(s) plastic bags, ambient	temperature			
6 1 1 1 10 700 61 1 1 1 1				
	Diameter 4 inches			
Depth of casing (ft) 80 feet				
Screen type Schedule 40, PVC, mill slot				
Slot size 0.020 inches So	creen interval (ft-ft)			
Type(s) of glue used to join casing <u>none</u>				
Type of gravel pack used 8-12 sand				
Amount of gravel pack usedsee_next_page				
Grain size distribution of gravel pack see specific	fication sheet			
Lithology of gravel pack Quartz, trace rock fi	ragments			
Source (company and quarry/pit) Arkhola Sand	& Gravel, Ft. Smith, AR			
Interval of gravel pack (ft.ft) 61–90 feet				
interval of graver paor (it-it)				
Interval of grouting (ft-ft) 0-57 feet				
Description of security measures 8 inch steel 1	protective casing and lid; secured with padloc			
Badlack ID No. Magter 3213	TAFR/SCR DEFD. Dadies			
Padlock ID No. Master 3213	Location of key(s) TAFB/SGB, DEEP; Radian			
D	59			

6	RAD	IA	N	Well Co	mpletion	Log: She	et 2/2		•	
Во	ring or \	Veli l	No. 6C	 	<u></u>	Project <u>Tink</u>	cer AFB IRP	Phase	II St	age 2
Lo	cationE	ast	Drive at Ent	ry Road A		Log Recorde	d By W.M.	Little		
⊨—			Schematic							
(ft)		···		Static leve	of water be	fore a	pprox. 67	feet		(ft) and
	_			after_	67.5 feet	(f1) developm	ent		• •
	٦ -	_	Protective casing	Developm	ent started 1	050 hrs, 2	8 June 198 8 June 198	<u>4</u>		
0-			Casing				g developme		gallor	ns
	-									
	-			Air lift	(drilling	rig) with	variable	discha	rge	
	2			Donth of a	pen hole ins	ide well				
10-	_ <u>4"</u>			•	developmer	ıt <u>90 f</u> e				(ft)
	PVC				evelopment	00 6-	et			(ft)
	casing		Grout							
	-				 	Develop	ment Record			
20		:			Clarity and	Odor	Lithology and Grain Size of	=	Conduc-	
	-			Time	Color of Discharge	of Discharge	Removed Sediment	Ph	tivity	Remarks
				1050	1 1		Silt			Very low flow
30 -	-			1150	heavy silt Red, mod-		Silt			Slowly ele-
		,		1150	erate silt					vating
					Shut down	to allow r	ecovery.			
	_ ^			1300	Blow appro	x. 10 gall	ons from h	ol e, s	owly o	learing.
60 -	-		Bentonite —							
	_	▽	Static							
	-		water level							
70 -										
	-									
	-						·			
80-	F -		Gravel				1		ł	
	4"		pack							
	PVC									
1	screen -									
90-	-	<u> </u>	_							
								L		<u> </u>

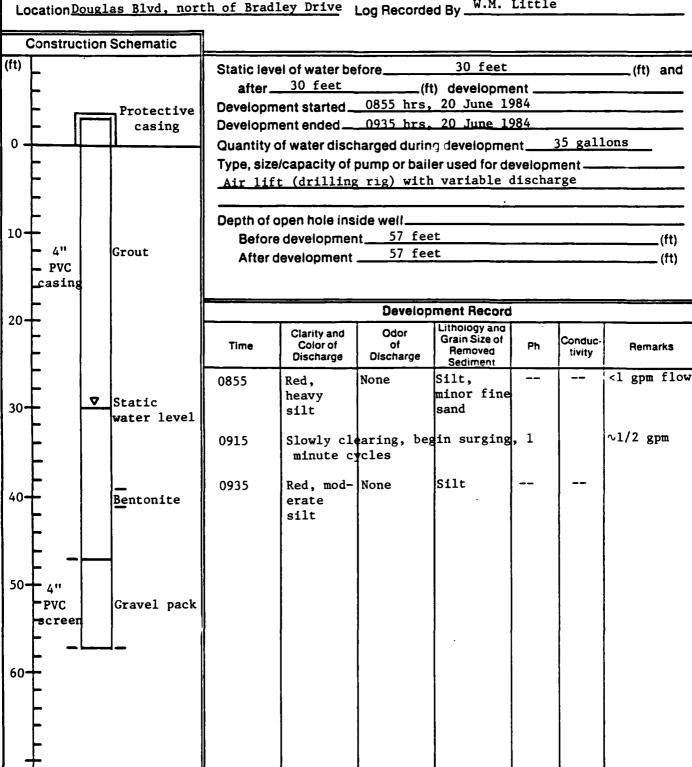
Well Completion Log: Sheet 1/2

Boring or Well No. 6D	Project Tinker AFB IRP Phase II Stage 2
Location Douglas Blvd, north of Bradley Dr.	Log Recorded By W.M. Little
Construction started 19 June 1984	completed
Development started 20 June 1984	completed 20 June 1984
Total depth drilled (ft)57 feet	
0.4.1	
Drilling method air rotary	
Problems encountered during drilling none	
	1
Water source for drilling and completion procedures	base supply
Crah camp	les from discharge
Number and type of samples collected Grab samp	les from discharge
Sample interval (ft-ft)variable	
Storage method(s) plastic bags, ambient t	emperature
Otorage method(s)	
Casing type Schedule 80 PVC, flush joint	Diameter 4 inches
Depth of casing (ft) 47 feet	
Screen type Schedule 40, PVC, mill slot	
Slot size 0.020 inches Scre	een interval (ft-ft) 47-57 feet
Type(s) of glue used to join casing none	
Type of gravel pack used 8-12 sand	
Amount of gravel pack used <u>see next page</u>	
Grain size distribution of gravel pack see specifi	cation sneet
Lithology of gravel pack Quartz, trace rock fra	gments
Source (company and quarry/pit) Arkhola Sand &	Gravel, Ft. Smith, Ak
/1 57 5	
Interval of gravel pack (ft-ft) 41-57 feet	
Interval of bentonite seal (ft-ft) 39-41 feet	
Interval of grouting (ft-ft)0-39_feet	
- 1.11 1 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0	
Description of security measures 8 1nch steel pr	otective casing and lid; secured with padlock
•	
Padlock ID No. Master 3213	Location of key(s) TAFB/SGB, DEEP; Radian

Well Completion Log: Sheet 2/2

Boring or Well No. 6D Project Tinker AFB IRP Phase II Stage 2

Location Douglas Blvd, north of Bradley Drive Log Recorded By W.M. Little



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Well Completion Log: Sheet 1/2

Boring or Well No. 6E	Project Tinker AFB IRP Phase II Stage 2
Location Douglas Blvd. at Entry Road A	Log Recorded By W.M. Little
Construction started 19 June 1984	completed 19 June 1984
Odingti detion started	completed
Development started 19 June 1984	completed20 June 1984
Total depth drilled (ft)115 feet	
Hole diameter 8 inch	<u> </u>
Drilling methodair_rotary	
Problems encountered during drilling none	
Motor course for delling and completion area during	base supply
Water source for drilling and completion procedures.	base supply
Number and type of samples collected Grab samp	les from discharge
Sample interval (ft-ft) variable	
Storage method(s) plastic bags, ambient t	emperature
Casing type Schedule 80 PVC, flush joint	Diameter 4 inches
Depth of casing (ft) 105 feet	
Screen type Schedule 40, PVC, mill slot	Diameter 4 inches
Slot size 0.020 inches Scre	
Type(s) of glue used to join casing none	
Type of gravel pack used 8-12 sand	
Amount of gravel pack used see next page	
Grain size distribution of gravel pack see specifi	cation sneet
Lithology of gravel pack Quartz, trace rock fra	gments
Source (company and quarry/pit) Arkhola Sand &	Gravel, Ft. Smith, AR
Interval of gravel pack (ft-ft) 99-115 feet	
Interval of bentonite seal (ft-ft) 97-99 feet	
Interval of grouting (ft-ft) 0-97 feet	
merval or grooting (KH)	
Description of security measures 8 inch steel pr	otective casing and lid; secured with padlock
Master 2212	TAED/CCD DEED, Dollar
Padlock ID No. Master 3213	Location of key(s) TAFB/SGB, DEEP; Radian

_					 .			 		
5	RAD	A	N	Well Co	mpletion	Log: She	et 2/2			
Bo	ring or \	Veil I	No. 6E			Project Tin	ker AFB IRP	Phase	II St	age 2
Lo	cation_)oug	as Blvd and	Entry Road	Α	Log Recorde	ed By W.M.	Little		
-	· ·		Schematic	7						
(ft)	Jonstiu	CHOIT	Schematic	Charle I			60 feet			(ft) and
				H .						(ft) and
			Protective	Developm	ent started	1455 hrs.	19 June 19	84		
	L [casing	Developm	ent ended	1615 hrs,	20 June 19	84		
0-		-	<u> </u>				ig developme		gallo	ns
	-	}		Type, size	/capacity of	pump or bail	er used for d	evelopn	nent	
1				Air lit	t (drilling	g rig) with	n variable	discha	rge	
				Don't of		ideell				
10-	_				•		feet			
	├ ,	Į,	Ĺ				feet			
	Ι-					-				(11)
60-	_	_ ▽	Static water level			Develop	Ment Record	<u> </u>		
	- 4" - PVC			Time	Clarity and Color of Discharge	Odor of Discharge	Grain Size of Removed Sediment	Ph	Conduc- tivity	Remarks
70-	easing		Grout	19 June 1455	Red, heavy sile	None	Silt			Low production
	L		1	1530	Over press	ure distu	bs sandpac	k, cea	se dev	eloping.
80-	<u>-</u>			20 June 1535	Red, heavy sil	None	Silt			Slowly clean ing ~1/2 gpm
				1615	Moderate silt	None	Silt			
90-	_									
	<u> </u>		Bentonite							·

5.81.3579

4" **-**PVC

screen

Gravel pack

R	A	D	A	N
			-	

Well Completion Log: Sheet 1/2

Boring or Well No. 6F Location DPDO Yard	Project Tinker AFB IRP Phase II Stage 2 Log Recorded By W.M. Little
Construction started 20 June 1984 Development started 21 June 1984	completed 21 June 1984 21 June 1984
Total depth drilled (ft) 102 feet Hole diameter 8 inch	
Drilling method <u>air rotary</u> Problems encountered during drilling <u>Sand collapsed</u> difficulty withdrawing.	
Water source for drilling and completion procedures	es from discharge
Sample interval (ft-ft) variable Storage method(s) plastic bags, ambient te	
	Nameter 4 inches
Screen type Schedule 40, PVC, mill slot Slot size 0.020 inches Scree Type(s) of glue used to join casing none	
Grain size distribution of gravel pack <u>see specific</u> Lithology of gravel pack <u>Quartz</u> , trace rock frag	ments
Source (company and quarry/pit) Arkhola Sand & Interval of gravel pack (ft-ft) 89-102 feet	Graver, Ft. Smith, AK
Interval of bentonite seal (ft-ft) 86-89 feet Interval of grouting (ft-ft) 0-86 feet	
Description of security measures 8 inch steel pro	tective casing and lid; secured with padlock
Padlock ID No. Master 3213	ocation of key(s) TAFB/SGB, DEEP; Radian

RADIAN Well Completion Log: Sheet 2/2 Project Tinker AFB IRP Phase II Stage 2 Boring or Well No ._ W.M. Little Location_DPDO Yard Log Recorded By _ **Construction Schematic** (ft) 82 feet Static level of water before_ (ft) and 82 feet after_ (ft) development -0900 hrs, 21 June 1984 Development started_ Protective 0940 hrs, 21 June 1984 Development ended_ casing 20 gallons Quantity of water discharged during development_ Type, size/capacity of pump or bailer used for development -Air lift (drilling rig) with variable discharge 4" PVC Grout Depth of open hole inside well-_casing 10~ 102 feet Before development_ (ft) 102 feet After development. **Development Record** 20 Lithology and Clarity and Odor Grain Size of Conduc-Time Color of of Remarks Removed tivity Discharge Discharge Sediment 0900 Red. Silt, ~1/4 gpm None heavy minor fine silt sand 80 Static water level 0910 Begin surging in 1 minute cycles Slowly clearing Bentonite 0940 Moderate None Silt 90 silt Gravel pack - PVC screen 100 110 D-66

Well Completion Log: Sheet 1/2

Boring or Well No. 6G Location West of Building 3117	Project Tinker AFB IRP Phase II Stage 2 Log Recorded By W.M. Little
Construction started 29 June 1984	completed 29 June 1984
Development started 30 June 1984	completed30 June 1984
Total depth drilled (ft) 90 feet	
Hole diameter 8 inch	
Drilling method air rotary	
Problems encountered during drilling Minor ca	ascading water from approx. 25 feet inhibits
cuttings	S
Water source for drilling and completion procedu	ures base supply
Sample interval (ft-ft)	samples from discharge
Storage method(s) plastic bags, ambien	nt temperature
Casing type Schedule 80 PVC, flush join Depth of casing (ft) 80 feet Screen type Schedule 40, PVC, mill slot Slot size 0.020 inches	Diameter4 inches
Type(s) of glue used to join casing none	
Type of gravel pack used 8-12 sand	
Amount of gravel pack usedsee next page	
Grain size distribution of gravel pack see spe	cification sheet
Lithology of gravel pack Quartz, trace rock	fragments
Source (company and quarry/pit) Arkhola Sa	nd & Gravel, Ft. Smith, AR
Interval of gravel pack (ft-ft) 76-90 feet	
Interval of bentonite seal (ft-ft) 73-76 feet	
Interval of grouting (ft-ft)0-73 feet	
Description of security measures 8 inch stee	l protective casing and lid; secured with padlock
Padlock ID No. Master 3213	Location of key(s) TAFB/SGB, DEEP; Radian

24.70

	RADIAN										
-)KPGEAT	08		Well Co	mpletion	Log: Sne	et 2/2				
Bo	oring or V	Vell N	No6G			Project Tink	cer AFB IRP	Phase	II St	age 2	
Lo	cation_	lest	of Building	3117	117 Log Recorded By L.N. French						
<u> </u>	2-2-4-4	4:00	Cabanatia	l		-					
(ft)	Jonstruc	XIOn .	Schematic	01 = A2 = A =			62 feet			'644	
,,,				Static level of water before 63 feet (ft) and after 81 feet (ft) development							
	Γ,		- Protective	Developm	ent started	0730 hrs	, 30 June 1	.984			
	-		casing	Development ended 0810 hrs, 30 June 1984							
0-	1	\vdash					g developme				
	ן ו							-			
				AIT 11II	(driiiing	rig) with	variable d	lschai	ge		
	-			Depth of c	pen hole ins	ide well					
10-	 						t				
1		- 1		After d	levelopment	90 fee	<u>t_</u>			(ft)	
	[├	-								
	- _{4"}		Grout			Develop	ment Record				
40-	PVC				Clarity and	Odor	Lithology and		Ī <u>.</u>		
	casing			Time	Color of Discharge	of Discharge	Grain Size of Removed Sediment	Ph	Conduc- tivity	Hemarks	
	-			0730	Red, very heavy silt		Silt, fine sand		1	Very low	
50 -	- '				Flush casi	ng to remo	ve material	insid	1		
	-				developme	nt.					
	-			0740]		low, slowly				
60	†			0805	Moderate silt	None	Silt, minor fine sand				
				0810	No change,	cease dev					
70-	-										
	-		Bentonite						:		
80-	┞ _	₽	Static								
	⊢ 4"		water level			Ì				+	
	_ 4" _ PVC _screen		Gravel pack			:					

Well Completion Log: Sheet 1/2

Boring or Well No. 7A Location 30 ft. north of SE 59th St.,	Project Tinker AFB IRP Phase II Stage 2 Log Recorded By L.N. French
75 ft. east of unnamed tributary of Soldier Creek	Log Recorded By.
Construction started 11 July 1984	completed 12 July 1984
Development started 12 July 1984	completed 12 July 1984
Total depth drilled (ft) 110 feet	
Drilling method air rotary	
Problems encountered during drilling None	
	base supply
Number and type of samples collected <u>Grab sam</u>	ples from discharge
Sample interval (ft-ft) variable	
Storage method(s) plastic bags, ambient	temperature
Casing type Schedule 40 PVC, flush joint Depth of casing (ft) 97 feet	Diameter 4 inches
Screen type Schedule 40, PVC, mill slot	
Slot size 0.020 inches Sc	reen interval (ft-ft) 97-107 feet
Type(s) of glue used to join casing none	
The of mount work word 0.12 and	
Type of gravel pack used 8-12 sand Amount of gravel pack used see next page	
Grain size distribution of gravel pack see specif	ication sheet
Lithology of gravel pack Quartz, trace rock fr	agments
Source (company and quarry/pit) Arkhola Sand	
00-200 (00-20) and quanty, proj	
Interval of gravel pack (ft-ft) 78-107 feet	
Interval of bentonite seal (ft-ft) 77-78 feet	
Interval of grouting (ft-ft) 0-77 feet	
Description of security measures 8 inch steel p	rotective casing and lid; secured with padlock
	
Padlock ID No. Master 3213	Location of key(s) TAFB/SGB, DEEP; Radian
	Location of key(s)

RADIAN Well Completion Log: Sheet 2/2 Boring or Well No. 7A Project Tinker AFB IRP Phase II Stage 2 Location See Sheet 1 Log Recorded By L.N. French **Construction Schematic** 75.25' below land surface (ft) Static level of water before_ (ft) and after_ (ft) development _ 12 July 1984 Development started_ Protective 12 July 1984 casing Development ended __ Quantity of water discharged during development 200 gallons Type, size/capacity of pump or bailer used for development -Air lift (drilling rig) with variable discharge Depth of open hole inside well ______ 4" 10+ Before development____ PVC After development _____ casing **Development Record** 60 Lithology and Clarity and Odor Grout Grain Size of Conduc-Time Color of of Ph Remarks Removed tivity Discharge Discharge Sediment 7:30a Turbid, None Silt, Start reddevelopment; trace sustained 70 brown very fine rate of 1 sand Static gpm water level 8:15a Turbid. None Little **E**entonite red-brown silt, no 80 sand 9:30a Cloudy, Trace Stop develop None light red silt ment Gravel pack 90 4" 1100 | - PVC screen Collapse D-70

Well Completion Log: Sheet 1/2

Boring or Well No. 7B	Project Tinker AFB IRP Phase II Stage 2
Location 200 ft. north of SE 59th St.,	Log Recorded By L.N. French
200 ft. west of unnamed tributary of Soldier Creek	
	completed11 July 1984
Development started 11 July 1984	
Total depth drilled (ft) 45 feet	
Hole diameter 8 inch	
Drilling method air rotary	
Problems encountered during drilling none	
Water source for drilling and completion procedure	s no water used
Number and type of samples collected Grab sam	mples from discharge
Sample interval (ft-ft) variable	
Storage method(s) plastic bags, ambient	temperature
Casing type Schedule 40 PVC, flush joint	Diameter 4 inches
Depth of casing (ft) 35 feet	Diameter
Screen type Schedule 40, PVC, mill slot	Diameter 4 inches
Slot size 0.020 inches Sc	reen interval (ft-ft) 35-45 feet
Type(s) of glue used to join casing none	
Type of gravel pack used 8-12 sand	
Amount of gravel pack used see next page	
Grain size distribution of gravel pack see specific	ication sheet
Lithology of gravel pack Quartz, trace rock fr	cagments
Source (company and quarry/pit) Arkhola Sand	& Gravel, Ft. Smith, AR
Interval of ground pack (ft ft) 30-45 feet	
interval of gravel pack (rt-rt)	
Interval of bentonite seal (ft-ft) 29-30 feet	
Interval of grouting (ft-ft) 0-29 feet	
Description of security measures 8 inch steel p	protective casing and lid; secured with padlock
Padlock ID No. Master 3213	Location of key(s) TAFB/SGB, DEEP; Radian

E C	RADIA	1N	Well Co	mpletion	Log: She	et 2/2				
Bo	oring or Well	I No. 7B		Project Tinker AFB IRP Phase II Stage 2						
				Log Recorded By L.N. French						
H	Constructio	n Schematic								
(ft)	-		after_	39.8 feet 1	bls(f	t) developme			(ft) and	
	┝╶╒═	Protective	Developm	ent started_	11 Ju	uly 1984				
 o -		casing	Developm	ent ended	narged durin	a developme	nt 20) gallo	ns (est.)	
	-		Type, size	Quantity of water discharged during development 20 gallons (est.) Type, size/capacity of pump or bailer used for development Air lift (drilling rig) with variable discharge						
10_]	Depth of c	pen hole ins	ide well					
	F _{PVC}	Grout	1	•			_	_		
	casing		After o	evelopment :					(11)	
20-	Γ Ι				Develop	ment Record				
	-		Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and I Grain Size of Removed Sediment	Ph	Conduc- tivity	Remarks	
30 -	E	Rentonite	9:00a	Turbid, red-brown	None	Silt	- -		Start development (0.5 gpm continuous)	
40-	4" ▼ PVC ▼ screen	Static water level Gravel pack	9:20a	Cloudy, red-brown	None	Silt			Sharp de- crease in pumping rate; pause in pumping to allow for	
50-	[- -	- 	10:30a	Cloudy	None	Some silt			water-level recovery Continued de	
	- - - -								crease in discharge; stop develor ment.	
_										

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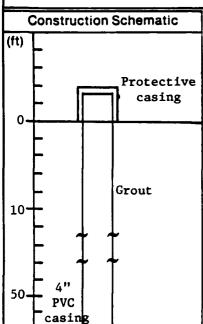
Well Completion Log: Sheet 1/2

Boring or Well No. 7C Location 375' north of SE 59th St., 75' west of unnamed tributary of Solider Creek	Project Tinker AFB IRP Phase II Stage 2 Log Recorded By L.N. French
Construction started10_July_1984	completed 10 July 1984
Development started 10 July 1984	completed 10 July 1984
Total depth drilled (ft) 102 feet Hole diameter 8 inch Drilling method air rotary Problems encountered during drilling None	
Management of the deliver and the second of	no water used
Water source for drilling and completion procedures	
Number and type of samples collected Grab samples	ples from discharge
Sample interval (ft-ft) <u>variable</u>	
Storage method(s) plastic bags, ambient	temperature
Casing type Schedule 40 PVC, flush joint Depth of casing (ft) 88 feet (below land su Screen type Schedule 40, PVC, mill slot Slot size 0.020 inches Scr Type(s) of glue used to join casing none	Diameter 4 inches
Type of gravel pack used 8-12 sand Amount of gravel pack used see next page Grain size distribution of gravel pack see specification of gravel pack see specificati	agments
Interval of gravel pack (ft-ft) 74.5-98 feet Interval of bentonite seal (ft-ft) 73-74.5 feet Interval of grouting (ft-ft) 0-73 feet	
Description of security measures 8 inch steel pr	rotective casing and lid; secured with padlock
Padlock ID No. Master 3213	TAFR/SGR DFFP Radian
Fauluck ID NO.	Location of key(s) TAFB/SGB, DEEP; Radian

Well Completion Log: Sheet 2/2

Boring or Well No. 7C Project Tinker AFB IRP Phase II Stage 2

Location_see sheet 1 Log Recorded By L.N. French



Quantity of water discharged during development est. 90 gallons

Type, size/capacity of pump or bailer used for development

Air lift (drilling rig) with variable discharge

	L									
50-	YVC		}				ment Record			
	casin	g		Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph	Conduc- tivity	Remarks
60-	- -			1:00p	Turbid, red-brown	None	Silt, trace fine sand			Start devel- opment
70-	- - -	፟፟፟፟፟	Static water level	2:15p	Turbid- cloudy, light- brown-red	None	Silt			
	- -		<u>Bentonite</u>	3:00p	Slightly cloudy, light red	None	Trace silt, no sand			Stop devel- opment
80-	- - -									
90-	4" PVC screen		Gravel pack		·	·				
100-	- - -		_							
	F					D-74				

の名を見るのからの質問の名の意味を開びからい、中国

Well Completion Log: Sheet 1/2

Boring or Well No. 7D	Project Tinker AFB IRP Phase II Stage 2
Location West edge of Landfill 6	Log Recorded By W.M. Little
	completed <u>29 June 1984</u>
Development started 29 June 1984	completed 29 June 1984
75.5-4	
Total depth drilled (ft) 75 feet	
Hole diameter 8 inch Drilling method air rotary	
g	
Problems encountered during drilling none	
Water source for drilling and completion procedur	res_base supply
Water Source for drining and sompletion proceeds.	
Number and type of samples collected Grab samples	amples from discharge
, , , , , , , , , , , , , , , , , , , ,	
Sample interval (ft-ft) variable	
Storage method(s) plastic bags, ambien	t temperature
Cabalula (O DVC flush inint	Diameter 4 inches
Casing type Schedule 40 PVC, flush joint	Diameter4_Inches
Depth of casing (ft) 65 feet	/ Jackson
Screen type Schedule 40, PVC, mill slot	Diameter4_inches
Slot size 0.020 inches	Screen interval (ft-ft)
Type(s) of glue used to join casing none	
Type of gravel pook used 8-12 cand	
Type of gravel pack used <u>8-12 sand</u> Amount of gravel pack used <u>see next page</u>	
Grain size distribution of gravel pack see spec	ification sheet
Lithology of gravel pack Quartz, trace rock	fragments
Source (company and quarry/pit) Arkhola San	d & Gravel, Ft. Smith, AR
Source (company and quarry/pit)	
Interval of gravel pack (ft-ft)64-75_feet	
Interval of bentonite seal (ft-ft) 60-64 feet	
Interval of grouting (ft-ft)0-60_feet	
· · · · · · · · · · · · · · · · · · ·	
Description of security measures 8 Inch steel	protective casing and lid; secured with padlock
Description of occurry measures	
Padlock ID No. Master 3213	Location of key(s) TAFB/SGB, DEEP; Radian
	n_75

F	RAD	<u>i</u> A	N	Well Co	mpletion	Log: She	et 2/2				
Во	ring or V	Veli l	No. 7D	.=		Project Tink	er AFB IRP	Phase	II St	age 2	
Loc	cation_	lest	of Landfill	6		Log Recorde	d By <u>W.M.</u>	Little			
	onstruc	tion	Schematic				<u></u>				
(ft)	- - -		Protective casing	after_ Developm	Static level of water before 57 feet (ft) and after 57 feet (ft) development 57 feet 57 feet 1035 hrs, 29 June 1984						
0-	-			Development ended 1035 hrs, 29 June 1984 Quantity of water discharged during development 35 gallons Type, size/capacity of pump or bailer used for development Air lift (drilling rig) with variable discharge							
10	- - - - - - - -			Before	Depth of open hole inside well Before development 75 feet (ft) After development 75 feet (ft)						
20	PVC					Development Record					
	casing -			Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph	Conduc- tivity	Remarks	
30-	- -		Grout	0935	Red, mod- erate silt	None	Silt		1	Production apprx. 1 gpm	
	- -										
	_			0955	Moderate silt	None	Silt			Production slows to <1/2 gpm	
40	- -				silt Slowly cle	aring, beg	In surging			slows to	
40 -				1035	silt	aring, beg	In surging			slows to	

D-76

Gravel pack

70 PVC

5 81 3579

Well Completion Log: Sheet 1/2

Boring or Well No. 7F Location North edge of Landfill 6	Project Tinker AFB IRP Phase II Stage 2 Log Recorded By W.M. Little
Cocation	
Construction started 22 June 1984	completed 22 June 1984
Development started 22 June 1984	completed 22 June 1984
Total depth drilled (ft)25 feet	
Hole diameter 8 inch	
Drilling method air rotary	
Problems encountered during drilling	
Water source for drilling and completion proced	ures_base supply
Number and type of samples collected Grab	samples from discharge
Number and type of samples conected	
Sample interval (ft-ft)variable	
Storage method(s) plastic bags, ambie	ent temperature
0.1.1.1	2 4-2
Casing type Schedule PVC, flush join	Diameter 2 inches
Depth of casing (ft)	
Screen type Schedule 40, PVC, mill slot	Diameter 2 inches
Slot size 0.020 inches	• • •
Type(s) of glue used to join casing none	
Type of gravel pack used 8-12 sand	
Amount of gravel pack used see next page	
Grain size distribution of gravel pack see spe	ecification sheet
Lithology of gravel pack Quartz, trace rock	c fragments
Source (company and quarry/pit) Arkhola Sa	and & Gravel, Ft. Smith, AR
Interval of gravel pack (ft-ft) 12-25 feet	
Interval of bentonite seal (ft-ft)10-12_feet	
Interval of grouting (ft-ft) 0-10 feet	
Description of security measures 8 inch stee	el protective casing and lid; secured with padlock
Padlock ID No. Master 3213	Location of key(s) TAFB/SGB, DEEP; Radian
	n 73

RADIAN	Well Co	mpletion	Log: She	et 2/2			
Boring or Well No	7F		Project Tink	er AFB IRP	Phase	II St	age 2
Location North edge	of Landfill 6		Log Recorde	d By W.M.	Little	!	
00							
Construction Schema			1/	(f			
"" -	u						(ft) and
		ent started_					
	ing Developm	ent ended	1032 hrs, 2	22 June 198	4		
0	14	of water discl				gallo	ns
Grout	Air lift	(drilling	rig) with	variable d	ischar	ge_	
	Don't of a		ide well			·	
10—Bentor		open hole ins e developmen					
Bellicon	After	ievelopment	2.	feet			(ft)
Statio	:	· •					(* */
1 1 -	level				- 7		
20 PVC Grave	pack		1	ment Record	 		
screen	Time	Clarity and Color of Discharge	Odor of Discharge	Grain Size of Removed Sediment	Ph	Conduc- tivity	Remarks
\ [1012	Red-brown heavy silt	Not determined	Silt			Wearing respirators
\ <u> </u>		Slowly cl	earing				
[1032	Clear		None			Production approx 1/2 gpm
 							
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D-78

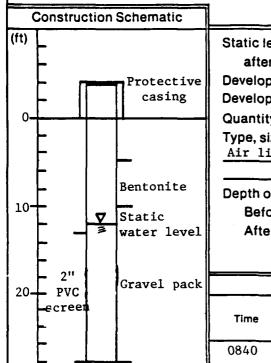
Well Completion Log: Sheet 1/2

Boring or Well No. 7G	Project Tinker AFB IRP Phase II Stage 2				
Location East edge of Landfill 6	Log Recorded By W.M. Little				
	,				
Construction started 21 June 1984	completed 22 June 1984				
Development started 22 June 1984	completed 22 June 1984				
Total depth drilled (ft)30 feet					
0.21					
Drilling method air rotary					
Problems encountered during drilling None					
	hage cupply				
Water source for drilling and completion procedures	base supply				
	* ***				
Number and type of samples collected Grab sam	ples from discharge				
Sample interval (ft-ft) variable					
Storage method(s) plastic bags, ambient	temperature				
Casing type Schedule 80 PVC, flush joint	Diameter 2 inches				
Depth of casing (ft) 13 feet	Diameter				
Screen type Schedule 40, PVC, mill slot	Diameter 2 inches				
Slot size 0.020 inches Sci					
Type(s) of glue used to join casing none					
_					
Type of gravel pack used 8-12 sand					
Amount of gravel pack used <u>see next page</u>	ication sheet				
Grain size distribution of gravel pack see specif	agment c				
Lithology of gravel pack Quartz, trace rock from Source (company and quarry/pit) Arkhola Sand	& Gravel Ft. Smith AR				
Source (company and quarry/pit) Michiela Bana	d ordered, 100 omassi, val				
Interval of gravel pack (ft-ft)10-28 feet					
Interval of bentonite seal (ft-ft) 5-10_feet					
Interval of grouting (ft-ft)0-5 feet					
Description of security measures 8 inch steel p	rotective casing and lid; secured with padloc				
Padlock ID No. Master 3213	Location of key(s) TAFB/SGB, DEEP; Radian				
T- 1					

Well Completion Log: Sheet 2/2

Boring or Well No. 7G Project Tinker AFB IRP Phase II Stage 2

Location East edge of Landfill 6 Log Recorded By W.M. Little



Collapse

30-

Static level of water before.	12 feet	(ft)	and
after 12 feet	(ft) development		
Development started 084	0, 22 June 1984		
Development ended 090	0, 22 June 1984		
	ed during development 15 gallons		
Type, size/capacity of pump	or bailer used for development		
Depth of open hole inside w	vell		
Before development	28 feet		_(ft)
After development	28 feet		_ (ft)

		Develop	ment Record						
Time	Clarity and Color of Discharge	Odor of Discharge	Lithology and Grain Size of Removed Sediment	Ph	Conduc- tivity	Remarks			
0840	Red, heavy silt	Not deter	- Silt			Wearing respirator. Initial production approx. 1+ gpm.			
0850	Lighter color & turbidity			- - -		Production slows to approx. 1/2 gpm.			
0900	Light grey-red silt		Silt						
		D-80							



APPENDIX E
Raw Field Data



Sediment Sampling

DATE 6/19/84 CHECKED WML DATE STATION: T-SED-Ø1-CC1 (CRUTCHO CREEK) LOCATION & NORTH SIDE OF CONCRETE CULUERT UNDER PATROL Rd, 150 FT. EAST OF RESERVE / POND Rd. SEDIMENT DESCRIPTION: SLUTY CLAY, RED. GREY LAYER OF SAND ENCOUNTERED JUST BELOW SURFACE. NOTES & TWELVE-INCH SEDIMENT PLUG COLLECTED AT EDGE OF POND IN NON-FLOWING CREEKBED, SECTION OF CREEK MORTH OF THE SAMPLING POINT APPEARS TO BE DISTURBED. CULVERT OUTLET INTERNAL DIAMETER = 1.95 METERS.

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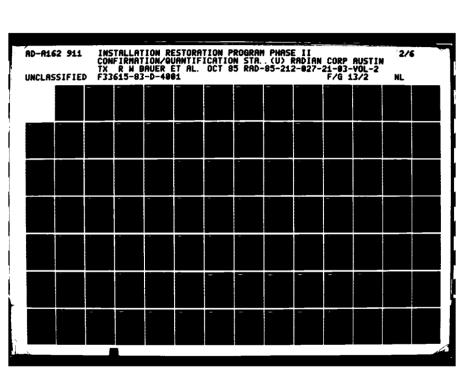
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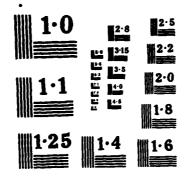
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RADIA

CALCULATION SHEET

DATE 6/21/84 CHECKED DATE STATIONE T-SED-27 LOCATIONS KHULMAN CREEK AT THE GOLF COURSE. SAMPLE COLLECTED 25 FT UDSTREAM OF FOOT BRIDGE SEDIMENT DESCRIPTIONS BLACK ORGANIC. NOTES: OILD FILM NOTED ON WATER SURFACE AT THE SAMPLING POINT FLOW VERY SLOW MUSICRAT OBSERVED IN STREAM. BOTTOM OF STREAM CONSISTS OF A BLACK PLASTIC SUBSTANCE, SAMPLE COLLECTED AS A COMPOSITE OF 2 PLUCS A PLUG WAS COLLECTED EROM EACH STREAM PANK ROSS-SECTION AT THE SAMPLING POINT & 15 2.0 CING DOWN STREAM

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Monitor Well Sampling

RADIAN

CALCULATION SHEET

SIGNATURE	DATE	CHECKED	DATE
PROJECT		JOB NO	

CALC. NO. -

SUBJECT_ SHEET_ OF_ SHEETS Depth Depth Well to Stickup Field Field Temp. to (inches) Cond. (°C) Sampler Number Water Bottom Date ph Comments 6G 84.67 93.07 3.13 7/16/84 11.4 840 20 DHG/NPS Well water very 9.4 420 turbid. Much 7.7 sediment. Approximately 15 Sample 7.9 320 gallons bailed by hand. The 3 measurements of ph and conductivity refer to the first 3 5-gallon bucketfulls. 6D 32.94 59.00 2.94 7/16/84 340 7.4 DHG/NPS Measurements 6.8 330 taken at approx-7.0 330 imately 5 gallon 7.0 Sample intervals. 22 gallons purged prior to sampling. 7 F 19.20 3.25 28.45 7/71/84 6.3 900 18 DGH/NPS Very red--high 6.4 Sample sediment. 12.97 7**G** 31.4 2.54 7/18/84 6.5 190 18 DHG/NPS Very red--high sediment. 6A 60.00 80.45 3.53 7/18/84 6.5-7 345 21 6B 67.28 92.68 3.01 7/18/84 6.5-7 460 20 NPS/DHG 6C 69.69 85.28 2.20 7/18/84 6.5-7 750 19.5 NPS/DHG Pump broke at approximately 2 well casings; bailed the rest. 6G 85.00 93.32 7/30/84 8.1 560 NPS/DHG Field duplicate. After evacuating approximately 10 gallons, well pumped dry. Waited for well to recover and then sampled (approximately E-33 45 minutes).

-81-3361

601, 624/625

CALCULATION SHEET

			OALU. NO
SIGNATURE	DATE	CHECKED	DATE
PROJECT		JOB NO	

UBJECT						. SHEET.		OF	SHEETS
Well Number	Depth to Water	Depth to Bottom	Stickup (inches)	Date	Field ph		Temp.		Comments
6E	63.11	115.55		7/30/84	7.4	490	18	NPS/DHG	Pumped 100 gal. before sampling.
6F	84.15	105	2.61	7/30/84	7.2	720	18	NPS/DHG	pH=7.1, C=740 @ 18 gal. Pumped 40 gal. before sample. 601, 624/625. Left to go set up next well and DPDO closed so grabbed sample first thing on 7/31/84.
7C	72.40	101.5	2.93	7/30/84	7.1	420	17	NPS/DHG	601, 624/625.
7▲	79.18	108.8	3.60	7/31/84	7.2	590	17	NPS/DHG	@ 33 gal., pH= 7.1, C=590. 55 gal. evacu- ated. 601, 624/625.
6 D	32.85			7/31/84	7.2	590	18	NPS/DHG	Field duplicate for 601, 624/625. @ 15 gal. pH = 7.2, C=600. @ 30 gal., pH=7.2, C=600.
2A	39.46	48.97	3.0	7/31/84	6.6	960	18.5	NPS/DHG	@ approximately 8 gal., pH=6.7, C=960. Approximately 20 gal. evacuated. 601 only.
6C	69.74			7/31/84	7.2	700	19	NPS/DHG	30 gal. evacu- ated. 601 only.
7 F	20.36			7/31/84	6.6	1400	19	NPS	20 L evacuated.
6A	60.00			8/1/84	6.5	440	20	NPS/DHG	101.40 gal.
					E-34				evacuated.

4-81-3361

RADIAN

SUBJECT.

CALCULATION SHEET

			CALC. NO.
SIGNATURE	DATE	CHECKED	DATE
PROJECT	·	JOB NO	

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Well Number	Depth to Water	Depth to Bottom	Stickup (inches)	Date	Field ph	Field Te Cond. (*		Sampler	Comments
7 G	13.03			8/1/84	6.0	250 1	17 1	NPS/DHG	@ approximately 25 gal., pH=6.8, C=620.
6B	Aprx. 67			8/1/84	6.8	640 1	19 1	NPS/DHG	@ approximately 35 gal., pH=6.8, C=600. 50 gal. evacuated. 601.
6D	32.9			8/1/84	7.2	580 1	18 1	NPS/DHG	@ 15 gal., pH= 7.2, C=590. @ 28 gal., pH= 7.2, C=580.
6G	84.69			8/1/84	7.7	530 1	19 1	NPS/DHG	Pumped dry @ approximately 12 gallons. Waited 20 min. for recovery. 601.
6E	62.88			8/14/84	7.3	450	I	DHG/AES	
6 F	83.89				7.1	740			
7C	72.24			8/14/84	7.6	420	1	DHG/AES	
7 A	79.17			8/15/84	8.8	570	1	DHG/AES	
7C	72.37			8/15/84	7.2	440	1	DHG/AES	

SHEETS



Base Well Measurements



CALCULATION SHEET

	CALC. NO.

SIGNATURE W.M. Little	_ DATE	CHECKED	DATE
PROJECT Tinker AFB IRP Phase II	, Stage 2	JOB NO. 212-027-21-	01

SUBJECT Depth-To-Water Measurements, Base Wells SHEET OF SHEETS

Well No.	Date	Depth to Water (ft)	Height of Measuring Point (inches)	Comments
16	10/1/84	235'	15 1/2	Cascading water interferes with measurement.
15	11	220'	20 1/2	do.
14	**	-	-	No access.
17	11	2051 4"	2	Open casing.
18	11	100' 8 1/4"	4	do.
19	11	240' 8"	4	do., sound of cascading wat
13	10/8/84	-	-	No access.
12	11	-	-	No access.
11	17	260' 5"	10	
20	11	310' 18 1/2"	7	
21	"	230' 8"	8	
17	11	205' 26"	2	Re-measurement.
22	10/15/84	-	-	No access.
23	**	230' 23 1/4"	7	Cascading water.
24	***	-	-	No access.
25	**	-	-	do., access port plugged.
26	11	-	-	do.



Report of Base Surveyors



DEPARTMENT OF THE AIR FORCE 2854TH CIVIL ENGINEERING SQUADRON (AFLC) TINKER AIR FORCE BASE, OKLAHOMA 73145.

REPLY TO

DEEE (Sgt Deguzman, 42868)

21 Aug 84

Supplier: Elevation Survey of IRP Phase II, Stage 2 Wells (Your Ltr, 2 Aug 84)

TO: USAFH/SGB

Results of wells survey, as per your request, is found on Attachment 1.

DAVID A. BURRIS, Chief

Engrg & Envmtl Planning Branch

2 Atch

1. Well Elevations

2. USAFH/SGB Ltr, 2 Aug 84



DEPARTMENT OF THE AIR FORCE USAF HOSPITAL TINKER (AFLC) TINKER AIR FORCE BASE, OKLAHOMA 73148

B AUG 1984

REPLY TO

SGB

subsect. Elevation Survey of IRP Phase II, Stage 2 Wells

2854 CES/DEE

Radian Corp requests that absolute well elevations surveys be obtained by 22 Aug 84 for the six on-base wells shown on attachment one. Similarly, they request that absolute elevations be obtained for the seven wells shown on attachment two. These wells rise about three feet above the ground surface and are approproximately eight inches in diameter. This data is needed to verify groundwater flow direction. Questions regarding this request should be addressed to Capt Cornell at ext 47844.

Du Mc Elvery

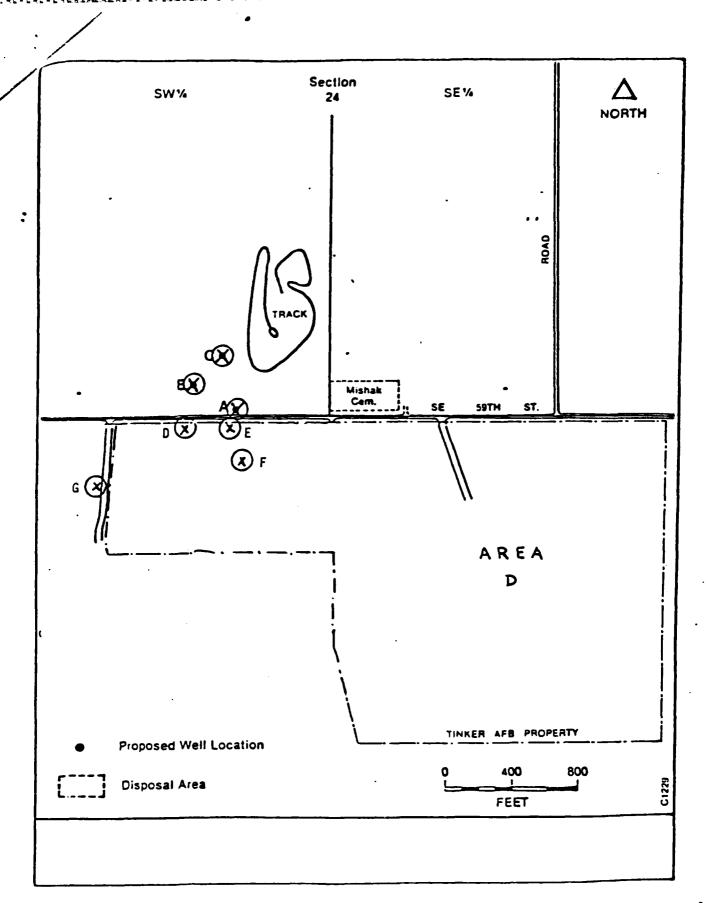
DAVID W. McELWEY, Lt Col, USAF, BSC Chief, Bioenvironmental Engineering Division

2 Atch:

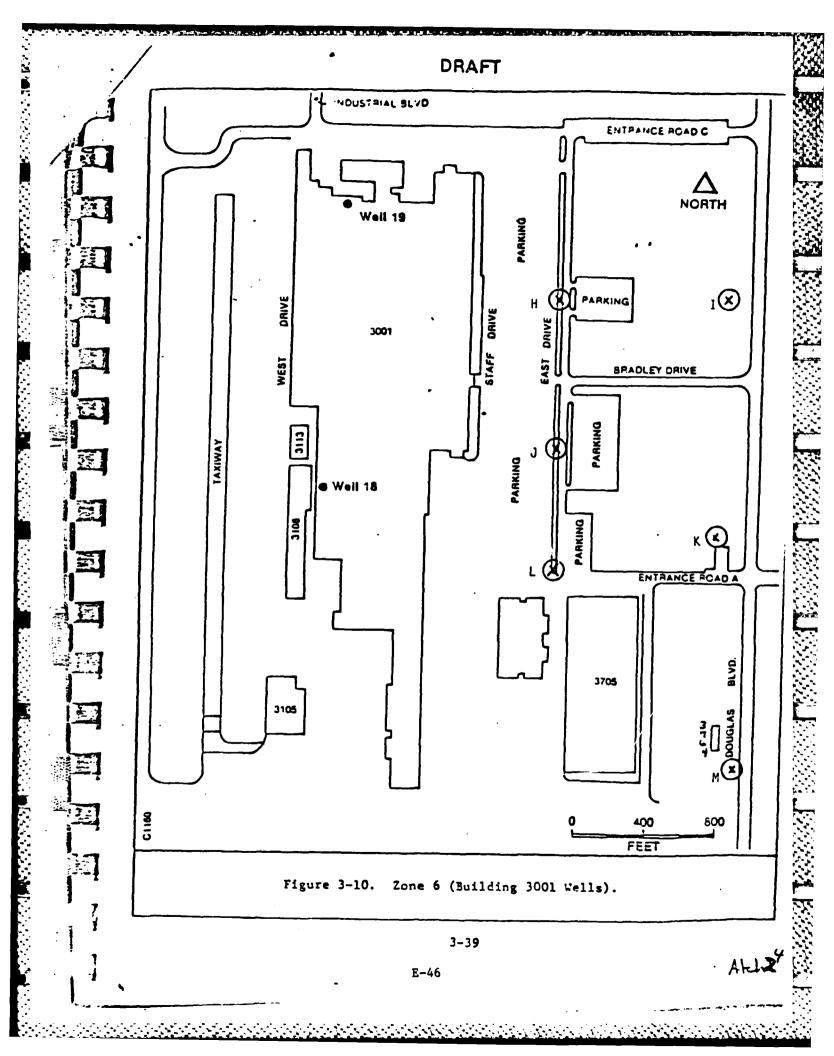
1)On-base well locations

2)Off-base well locations

£ 2 AUG REDE



Atch Z3



METT	ELEVATION
WELL "A"	1277.73'
WELL "B"	1281.68'
WELL "C"	1272.30'
WELL "D"	1282.55'
WELL "E"	1280.991
WELL "F"	1280.48'
WELL "G"	1300.00'
WELL "H"	1271.91'
WELL "I"	1256.15'
WELL "J"	1271.58'
WELL "K"	1270.22'
WELL "L"	1271.03'
WELL "M"	1287 201



APPENDIX F

Sampling and Analytical Procedures



Field Procedures



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QUALITY ASSURANCE

The bulk of the field sampling procedures were presented in Section 3.0 of the report. The purpose of this Appendix Section is to describe the quality control and quality assurance aspects of the field program.

Many of the traditional quality assurance techniques (duplicate or spiked samples, for instance) are designed to test instrument or analyst performance and do not address the needs of a field program of monitoring well installation. In lieu of such techniques, field practices are built around a principal of "do it right the first time", and procedures are developed to insure this. The three main elements of the field QA program are:

- Record-keeping;
- Peer review; and
- Technical staff management review.

Eash is discussed below.

Record-Keeping

Each supervising geologist kept field notes as the coring and well installation activities progressed. In addition, the drilling subcontractor's team chief also kept field notes. These two sets of notes were compared to develop the logs of drilling activities shown in Appendix D. Discrepancies were resolved by reference to the geologic samples collected.

Ground-water samples were collected in accordance with a written list. The servicing laboratory prepared sample containers and provided them to the field team, who were working from the same list. After the samples were logged into the laboratory, the log-in sheets were compared against the original analytical schedule. All samples were shipped or hand-carried to the laboratory, accompanied by chain-of-custody forms (Appendix G).



Peer Review

Each of the supervising geologists served overlapping tours of duty in the field. This provided all with the opportunity to participate in broad portions of the study, rather than focusing on a single zone. Each person overlapped with his successor to insure a smooth transition. Once the field effort was concluded, the supervising geologists were assigned to write up separate zones. These writing assignments provided for close coordination with other members of the field team, so that observations during drilling and sampling were incorporated into the text. After the drilling logs and report text were prepared, they were reviewed for completeness and accuracy by other members of the field team. Thus, each portion of the report was subjected to peer review before entering the formal review process.

Technical Staff Management Review

After the complete report was finalized by the Project Director, it was formally reviewed by a senior member of Radian's technical staff management. This review focused on quality of presentation and soundness of discussion and recommendations.

FIELD EQUIPMENT CALIBRATION

This program utilized very little in the way of field instrumentation. The four items of equipment were:

- pH meter (Corning Model 610A with a combination electrode), standardized daily against pH 7.00 and 10.00 or 4.00 buffers.
- Conductivity meter (YSI Model 33), calibrated before deployment against an 800 µmho standard and daily internal calibration check ("red line"):



- Water level probe (Soiltest Model 762A), no calibration required; and
- Threshold Limit Value Detector "TLV meter" (Bacharach Model 23-7231), zeroed with organic-free air and spanned with hexane standards. Not used for emissions level data determinations, but only for field drilling safety.



Laboratory Quality Assurance Program

Quality Assurance/Quality Control
Program
for
Radian Analytical Services



THE QUALITY ASSURANCE/QUALITY CONTROL PROGRAM FOR RADIAN ANALYTICAL SERVICES

Radian Analytical Services' (RAS) objective is to provide high quality chemical analyses to all clients regardless of the size of the analytical task. To aid in achieving this goal, a strong quality assurance program and rigid quality control practices are integral parts of all analyses. This document describes these quality assurance/quality control protocols for the Radian Analytical Services laboratories.

The basic quality control program includes procedures for sample handling, calibration, spiking and replicate analyses, analysis of QC test samples, equipment maintenance, and supplies control. These procedures can be integrated with a client's additional requirements, such as spiking studies, analysis of replicate samples, linearity determinations, and stability studies.

The quality assurance program consists of the frequent submission of blind QA samples, duplicates, and spiked sample splits. Also included are personnel training, analytical methodologies, sample control procedures, data handling, and equipment maintenance and calibrations.



1.0 QA Organization/Policy

The objective of Radian's quality assurance/quality control program is to assure, assess, and document the precision, accuracy, and adequacy of data obtained from chemical analysis and to assure the technical accuracy of the results obtained for all samples.

Radian has organized the quality assurance function within the company to allow complete independence of program review. Radian's Quality Assurance Director reports directly to the Vice President of the Technical Staff. This position provides independent reviews at all levels of the technical staff and laboratory organization and allows immediate access to Radian's top management on QA-related matters.

The QA Director's involvement may be limited to a review of quality control practices or as extensive as active development and implementation of quality control procedures and statistical data analysis. The QA Director may be asked to contribute expertise and assistance when a need is perceived by either the client, the technical staff, or the management staff.

Because of the large number of samples analyzed by RAS, a QA coordinator has been assigned to monitor and maintain an effective QA/QC program for these laboratories. The RAS Quality Assurance Coordinator, directly responsible to the Corporate QA Director, serves as an independent auditor of all RAS laboratories. The responsibilities of the RAS QA Coordinator are as follows:

- Monitor QA/QC within RAS laboratories,
- Supervise the preparation of blind audit samples,



- inform the Director of RAS and the corporate QA Director of quality assurance problems,
- summarize and report QA activities in the laboratories,
- document all QA and QC procedures within RAS,
- act as liaison between the corporate QA Director and RAS,
- provide QA data to the corporate QA Director for inclusion in the corporate QA reports.

The RAS laboratory managers function as the quality control coordinators in each particular analytical area. Their efforts are coordinated and monitored by the QA Coordinator.

Quality control coordinators serve as a focal point for all QC activities pertaining to each RAS laboratory. They work as a committee coordinated by the RAS Quality Assurance Coordinator. Their activities include the following:

- monitor the QA/QC activities of the laboratory area,
- inform the Director of Analytical Services and the QA coordinator of QC problems and needs.
- summarize, document, and report quality control activities
 and data generated in the laboratory,



- provide documentation of all QC procedures in the laboratory,
- maintains summaries of QC activities and data in a form suitable for client review upon request.

2.0 Quality Control for Laboratory Analyses

Radian Analytical Services has developed and implemented quality control procedures for all of the analyses performed in the laboratory. The laboratory quality control program provides an effective and efficient laboratory protocol for QC regardless of the size or scope of the analytical requirements. Approved analytical methods are used whenever available. When approved methods are not available, a method is developed by the Radian technical staff, and a technical note written describing the method. The quality control procedures are designed to insure that the standard operating procedures and quality control protocols are being followed and accurate results are obtained.

The general quality control program utilized in each laboratory includes consideration of the following areas:

- personnel training and certification,
- analytical methodology documentation,
- sample handling and control,
- laboratory facilities and equipment,
- calibration and standards,
- data handling and documentation,
- quality control check samples,

The general approach to quality control in each of these areas is discussed in the remainder of this section.



ACCUMENTATION DESCRIPTION SERVICES

2.1 Personnel Training and Certification

The successful implementation of any QA/QC program is determined by the training and dedication of the laboratory personnel. The quality and consistency of data should be independent of the analyst. With the proper training and supervision, an analyst will be able to obtain quality data by the use of proven methodology. Periodic assessment of training requirements and certification are performed to maintain a high level of laboratory awareness.

The training and certification methods employed in the RAS laboratories are briefly described below:

- study of laboratory standard operating procedures,
- study of QA manual,
- observation of experienced operators/analysts,
- study of operating manuals,
- instruction by the laboratory manager on all aspects of the analysis,
- perform the analysis under the direct supervision of the laboratory manager,
- perform analysis under supervision of experienced personnel,
- analysis of blind QC samples prepared by laboratory QC coordinator.
- participation in in-house seminars on laboratory methods and procedures.



PERSONNEL TRAINING RECORD

	_						
Employee Numb	er _						
Date of Emplo	yment _						
Laboratory Or	ientatio	n:					
Upo and Laborator					onnel train: e step compl		loyee
•		S laborato ead and un			iting Proced	lures have	
				Employee	Lab Mgr.	Date	
•	the pro		or the	laboratory	has been re y in which t		ee
				Employee	Lab Mgr.	Date	
•			s anal	instruments yses have h	with which		
	the prounders		or ope	ration and	maintenance		
Instrument E	unders	tood.	•			e are	<u>Date</u>
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Test Specific Training:

Each specific test performed in the RAS laboratories involves procedures which may be unique. The steps involved in training an employee are:

- <u>Instruction</u> by the Laboratory Manager on all aspects of the analysis,
- Observation of experienced operators/analysts,
- Perform the analysis under supervision of the laboratory manager,
- Perform analysis of QA samples submitted by the QA coordinator, and
- Participation in in-house <u>seminars</u> on laboratory methods and procedures.

The following table is to be completed by dating and initialing by the employee and Laboratory Manager upon completion of each step.

Method	Instruction	Observation	Perform the Analysis	Analysis of QA samples	Seminars
 -	·				
					
					
					
					
	-				
					



THE COURSE OF SECTIONS OF MANAGEMENT

All RAS personnel must complete a quality control training program. This system includes motivation toward producing data of acceptable quality and involves "practice work" by new employees. New personnel are made aware of the quality standards established by RAS and the reasons for those standards. They are made aware of the various ways of achieving and maintaining quality data. After an employee has been trained to use a method and the work validated by the laboratory manager, the employee is certified to perform the analysis. As these people progress to higher degrees of proficiency, their accomplishments are reviewed and then documented. Documentation of proficiency training is maintained by the QC Coordinator for each laboratory technician using the two-page form shown in Figure 2-1.

2.2 Analytical Methodologies

All analytical procedures followed in the RAS laboratories are documented in a methods manual for the specific laboratory. A set of standard operating procedures (SOP) has been established for each analysis to insure consistency. Most methods used are directly from an approved analytical manual, e.g., EPA methods, APHA Standard Methods for Water and Wastewater, ASTM, etc.

Methodologies may contain the following information:

- method title,
- scope of method,
- summary of interferences, and applications,
- concentration ranges and detection limits,
- safety precautions,
- required equipment and materials,
- standardization directions,
- detailed analytical procedure,
- calculations, with examples,
- reporting method,
- precision and accuracy statement,
- references.



2.3 Sample Control and Record Keeping

The Radian Analytical Services Sample Control Center is a controlled access area. Only employees of the Sample Control Center have access to sample receiving, sample storage, documentation files, and the computer terminals. Analysts check out samples under the supervision of the sample control personnel. All samples are stored in locked storage areas. Sample tracking is maintained by a computerized laboratory management system and a sample checkout logbook. The RAS Sacramento laboratory is linked to the central processing unit of the computer in Austin via a dedicated phone line. This insures that the laboratories are in constant communication. All sample information and data entries can be immediately accessed at either location.

Detailed record keeping and control of samples are essential for effective laboratory operation. All samples received for analysis in the Radian Analytical Service laboratories are processed through the Sample and Analysis Management System (SAM). Radian Corporation's SAM is a software and hardware system for controlling and handling information for the analytical laboratory. SAM provides a dynamic, easy-to-use method for tracking, scheduling, reporting, and laboratory management. The system has been designed to accommodate and promote good laboratory management practices by providing high visibility of the information laboratory managers need to make good decisions regarding schedules and priority. The system is designed around a Data General Nova-IV computer with a 64K-byte memory. It also includes a 65M-byte disk drive and a line printer with plotting capabilities. Data is entered via a TEC terminal and CRT. All data stored on the disk is backed up on magnetic tape to prevent loss in the event of a system malfunction. The system is designed so that an individual designated as the principal operator can process the required paperwork for a large laboratory with little difficulty. The approach centralizes information input and data retrieval, and provides the mechanism for organized, up-to-date laboratory performance monitoring.



SAM maintains complete client information files, generates laboratory status reports, flags sample analyses which are overdue, accepts analysis results manually or automatically, and generates reports and invoices.

The Sample Control Center and SAM have six basic functions:

- sample receipts and logging,
- sample storage and maintenance of sample integrity,
- laboratory status reporting,
- document control,
- data compilation and reporting, and
- invoicing.

In order to assure the integrity of a sample and the accompanying documentation, a security plan has been established. This plan consists of three parts:

- chain of custody,
- secured refrigerated storage, and
- document control.

The progression of samples and documentation through the Sample Control Center and the analytical laboratories is presented in Figure 2-2. Detailed descriptions of each sample control function are presented below:

- Samples are received from the commercial carrier at Radian's shipping and receiving facilities by the receiving clerk.
- Within one hour of arrival, the samples are accepted by RAS sample control personnel.



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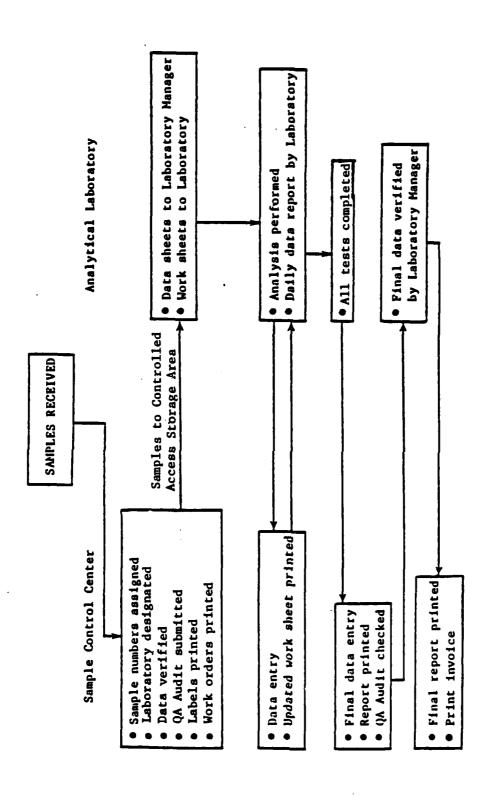


Figure 2-2. SAM Laboratory Management System



- All shipping containers and security seals, when appropriate,
 are inspected for physical damage or evidence of tampering.
- The samples are unpacked in the sample receiving area by the RAS sample custodian. The method of shipment, shipping container integrity, condition of samples, the number of samples/container, integrity of the security seal, and accompanying documentation are noted. Sample identification is verified against custody documents. The enclosed chain-of-custody forms, Figure 2-3, when required, are completed and filed with the shipping and receiving documentation. In the event that peculiarities are noted, the project officer or client is immediately advised of the irregularity.
- Samples are logged into a bound sample logbook, Figure 2-4.
 Again, sample identity is verified. All discrepancies are noted in the logbook.
- The handwritten logbook and all documentation are transferred to the Sample Control Center.
- The samples are logged into the SAM system. Each batch of samples is assigned a consecutive work order number by the system. Analytical requirements for each sample are entered into the computer.
- Hard copy of the work order and other information is printed and filed with the received documentation in the Sample Control Center.
- Labels are printed and secured to each sample. Label information includes sample number, identification, storage location, and analytical requirements.



CHAIN OF CUSTODY RECORD

•	FIGU	g Sample No
Company Sampled / Address		
Sample Point Description		
Stream Characteristics:		
Temperature	Flow	pH
Collector's Name	Date/Time Sampled	
Amount of Sample Collected		
Store at: Ambient 5°C -	10°C Other	
☐ Caution - No more sample available	☐ Return unused portion of sample ☐ I	Discard unused portions
-	Hazards	
☐ Hazardous sample (see below)	☐ Non-hazardous	s sample
□ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C
☐ Pyrophoric	☐ Lachrymator	□ Shock sensitive
☐ Acidic	☐ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	☐ Radioactive
☐ Other		
Sample Allocation/Chain of Possession	on;	
Organization Name		
	Date Received	
•	Lab Sample No	
Inclusive Dates of Possession		
Organization Name		91
Received By	Date Received	I IM#
·	Lab Sample No	
Organization Name		<u>. </u>
Received By	Date Received	Time
Transported By	Lab Sample No	
Comments		
Inclusive Dates of Possession		



Lab	No.		
-----	-----	--	--

Company	0	uoted \$	Contact	
Facility	s	ample \$	Received	
		Misc \$	Date Due	
Rep		Total \$ nv by (CPR)	Samples	
Phone	1	nv by (CPR)	Keep for	
Report	<i>/</i> e	Darcherke	reeb til	
to		Disc: All	Disp (RD)	
	#	Reports	# Invoices	
Attn		ork ID		
		Taken		
		Trans		
		Type	·	
		ndition		
Attn	_ ·	mments:		
P.O. #				
Expires				
	L	ocation:		
Dash No.	Sample Description	Analysis	Required	QA
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Figure 2-4. Sample Log Sheet



- Data sheets and work sheets are printed for each batch of samples and distributed to the appropriate laboratory managers. The work sheets list sample numbers, sample identification, storage location, and analytical requirements. Data sheets are for results and contain only the parameters to be determined by a given laboratory.
- Following sample logging, the samples are placed in the designated locked storage area.
- Subsequent sample custody is documented and all transactions witnessed by sample control personnel.
- The analyst retrieves the samples from the Sample Control Center by sample number and storage location.
- The Sample checkout log (Figure 2-5) is completed by the analyst, noting the laboratory to which the sample is being removed.
- After analysis, or when the required aliquot is removed, the sample is returned to the Sample Control Center and return is noted in the sample checkout log.
- The sample is returned to the designated storage location.
- When requested, addition chain-of-custody documentation can be provided using a SAM-generated document (Figure 2-6). This document can be retained by sample control to provide a more easily retrievable record of sample custody within the analytical laboratory.
- The sample is stored until the assigned time or written permission is given to either properly dispose of or return the sample to the client.

RAS SAMPLE CHECK OUT LOG

Control of the Contro

•		7S/196	Prep. Labs)	78/194	(Extraction & Water Labs	75/180	(ICP and AA Labs)	75/191 (TOX, TCC)	78/195	(Technician)	7S/171 (GC)		
MATION	INITIALS												
TURN INFOR	TIME INIT	_											
RE	DATE												
	INITIALS												
TNFORMATION	TIME DESTINATION	_											
CHECK-OIL	TIME	. •							,				
	DATE									•			
	SPLITS REMOVED												
-	ORK ORDER												

Figure 2-5. Sample Checkout Log

PAGE 1 RCVD: 02/26/83 DUE: 03/19/83

Analytical Serv CHAIN OF CUSTODY 04/21/83 09:56:49

LAB # 83-02-A67 KEEP: 05/09/83

DISP: D

このころ	SAFFLE	DASH SAMPLE IDENTIFICATION	LOCATION	3							
01A-B	Number 001	001	Ref 2		CAUSTY	CO3_A SO3_TA	HARD_B TANNIN	₩-E03H	HCO3_A MHO_A	ARD_B HCD3_A MHD_A DNG_A PH_A ANNIN	PH_A
02A	Number 002	Number 002 Ref 2	Ref 2		I ACFS						
028	Number 002	002	Ref 2		1 ICP_40						
O3A	Super soil	Super soil Ref	Ref 2		I ANFS						
04A	Boiler	Boiler scale 222 Ref	Ref 2		- CA E - P E	CL_TA SO4_NA	CO3_A 8_E	FE_E ZN_E	₩СОЗ_А	CO3_A MG_E NA_E	NA_E
05A	Sample AV56	15A Sample AV56 Shelf 13	Shelf 13	13	1 B_MET	C_MET					
06A	Ester.	#164 Ref. 023	Ref. 023	23	 M M E	AS_HA	BA E PB GA	CD_E SE_HA	CR_E	FE_E	HO_CA
06B	Water #164	#164	Ref. 023	23	ו כר_דא	F_SIEA	MHO A	₩ EON	PH_A	SO4 NA TDS A	TDS A
0 90	Water	#164	Ref. (023	I HIRCRA	PIRCRA					
09D	Water	#164	Ref. (023	1 ALPHA	BETA	RA_TOT				

FRACTION NUMBERS.				
DATE				
RETURNED TO				
DATE				
RECEIVED BY				

Figure 2-6. Laboratory Chain of Custody

F-29



All documentation, including shipping documents, field sampling documents, computer-generated log sheets, chain-of-custody forms, laboratory data sheets, final computer reports, and other documents, are maintained in the sample control area. All reports are kept in locked filing cabinets. As with the sample storage area, the document storage area is limited-access.

All storage areas are within the Sample Control Center and are locked when not in use. Access to the storage area is limited to sample control personnel or other RAS employees accompanied by sample control personnel. There are four storage locations that are used depending on the sample and the required analyses. They are:

- ambient storage for samples that do not require refrigeration,
- 4°C storage for most samples requiring water quality analysis and extractable organics,
- 4°C storage for samples requiring volatile organic analysis, and
- -20°C storage for extracts and samples that require freezing.

A temperature log is maintained to monitor the cold storage facilities.

2.4 <u>Laboratory Facilities and Equipment</u>

A clean well-lighted, and well maintained laboratory is essential for accurate analytical results. Each laboratory is well-lighted, air conditioned and equipped with chemical fume hoods. Instrumentation that may emit noxious odors is vented externally.



Quality Control of Equipment and Supplies

Each laboratory QC program includes detailed requirements for equipment and supplies. Reagents, solvents, and standards with specific levels of purity are used as specified by the analytical protocol. Specific GC column materials, glassware and sample handling equipment are also specified. The quality control procedures for equipment and supplies generally include the following items:

- operator checklists for required supplies,
- documentation and reporting of all deviations from specified instrument performance,
- procedures for testing for purity of reagents,
- tolerances for calibrated glassware where applicable,
- monitoring of refrigerated storage space,
- maintenance logbooks,
- service contracts on analytical instrumentation.

Quality control procedures during sample preparation include the preparation of reagent or solvent blanks. Additional quality control techniques implemented in sample preparation include:

- deionized water piped into all laboratories, monitored daily,
- purchasing high purity distilled-in-glass solvents in large quantities from a single lot,



- use of Ultrex acids in trace metal digestion,
- cleaning of organic glassware with chromic acid or firing in a kiln at 450°C.
- cleaning of trace metal glassware with nitric acid,
- use of organic-free water prepared at Radian by distillation over alkaline permanganate under nitrogen atomsphere in allglass still,
- use of volatile-free water prepared by purging organic-free water with nitrogen,
- sample preparation performed by experienced technical personnel under the supervision of senior level analysts.

2.5 Quality Control for Standards and Calibration

The quality of all test results is greatly impacted by the calibration procedures used. Calibration procedures and standards should be specified for all equipment and supplies used in the test procedure. Traceability to common standards is essential for test procedures to be used in multiple laboratories. Quality control procedures for standards and calibrations include the following considerations:

- written, detailed calibration instructions,
- preparation procedures for secondary standards, when applicable,
- requirements for frequency of calibration,
- recordkeeping of all calibrations and standards used,



- quality control charts for recording results from multiple calibrations,
- evaluation of internal standards, and
- tolerances for calibration requirements.

All calibration standards are prepared from NBS-traceable, EPA certified, or primary standard materials. Daily logs are maintained to monitor instrument response to a given standard.

Quality Control Test Samples

Routine quality control samples to be analyzed concurrently with client samples are a significant portion of the RAS laboratory quality control programs. The purpose of these checks is twofold: 1) to assure that samples being analyzed satisfy predetermined standards of accuracy, and 2) to measure and document achieved levels of accuracy and precision.

There are many different types of quality control samples which could be used for these purposes. The correct combination of these will depend on the complexity of the test method and the desired degree of accuracy. The following quality control parameters are general considerations for Radian's quality control for test methods.

Interferences

The analytical results of a test method might be affected by interferences from the glassware, solvents, reagents, or the sample matrix. Blank samples which are subjected to conditions similar to samples being analyzed are used to evaluate the purity of laboratory reagents. The frequency of blank analysis is method dependent. For example, a laboratory or field blank is analyzed after each GC/MS volatile organic analysis with high levels for any of the pollutants. Ten percent of the samples from a



given sample batch are spiked with a known standard. Spike recovery data are calculated to determine matrix interference.

Precision

The precision or repeatability of a test method is required for proper interpretation and weighting of the data. Replicate samples or standards are used to determine the precision on a regular basis. The precision of multiple analyses are compared against predetermined precision limits to determine their acceptability. The precision is usually reported as a standard deviation or repeatability statistic and often depends on the concentration of the parameters analyzed. Replicate analyses are defined as separate digestions or extractions of the same sample, when possible. The percentage difference or range between replicate analyses is also used to monitor precision.

Reproducibility

The reproducibility of a test method refers to the repeatability over a period of time. How well will analytical results repeated a month later agree with today's results? Reproducibility can be measured by the repeated analysis of samples from a previous time period or by analysis by more than one laboratory or laboratory technician.

Qualitative Specificity

In the analysis of complex sample matrices containing multiple components, the use of a single method can lead to misidentification of compounds. The misidentification can be detected by repeated analysis of standards containing the compounds of interest or by independent analysis by a more specific method. For example, mass spectral confirmation can be used to evaluate misidentification problems in the GC laboratory.



2.6 Documentation and Data Handling

Documentation of methods, procedures, and results is an essential aspect of a QA/QC program.

Adequate documentation is required for an instrument maintenance system. RAS laboratories use an individual logbook, which is kept at each instrument, to record all calibration and maintenance activities. This logbook gives a chronology of that instrument's installation, operation, calibrations, maintenance, malfunction, and repairs. An accompanying binder includes all pertinent manufacturing information, service manuals, and similar reference materials.

Directions for calibrations and maintenance, along with appropriate forms and checklists, are maintained in a manual accompanying the logbook. The directions specify the required frequency for calibrations and maintenance, the tolerances for calibrations, and the action to be taken when calibration requirements are not met.

In this system, there is a single source for reference purposes as well as record keeping. All the instrument logbooks are reviewed periodically by the quality assurance coordinator and laboratory manager. A record of these logbook checks is maintained by the QA coordinator.

Work sheets have been developed to insure consistent laboratory data entry for most parameters determined in the laboratories. These sheets are designed to organize the data in a clear and logical manner, and to simplify calculations. The work sheets are divided into various sections including a section for reporting calibration standards and blank values and a section for plotting calibration curves. These work sheets are usually a standard data entry form which the laboratory technician enters in his/her bound lab notebook. When automated calibration is not applicable, electronic calculators are available in the laboratories to generate calibration curves by the method of least squates. Thus errors in reading calibration curves and calculating data are minimized. After an analysis



なり、自動をはなるなど問題を含めて大きな問題を含むできた。

is completed and a data sheet filled out, the laboratory manager checks the data for completeness and approves the data sheet. After the data have been entered into the SAM system, an updated data sheet is issued to the laboratory manager. When the work is complete, a preliminary report is printed and distributed to the contributing laboratory managers for the final data check and approval. A final report is printed, certified by the laboratory manager, and forwarded to the client.

Proper documentation of quality assurance and quality control activities is an essential requirement. Documentation is needed to demonstrate that quality control activities were completed as scheduled and to communicate the results of the QC tests to laboratory managers and clients. Documentation of QA results is required to provide feedback for improvement of quality control programs.

Quality control documentation should be timely in order for feed-back to occur. Daily reporting to laboratory managers is mandatory. Forms are designed to organize the QC data in a clear and logical manner, and to simplify calculations. Control charts are another excellent tool for summarizing quality control test results.

As part of Radian's QA audit program weekly reports summarizing audit results in the laboratories are prepared and distributed to QC coordinators.

3.0 Quality Assurance Audits

The quality assurance audit program of the RAS laboratories is conducted by the RAS QA Coordinator in conjunction with the corporate QA Director. The program consists of the following:

 QA standards are prepared using EPA certified standards, NBS standards, primary standard materials, and NBS-traceable compounds. All standards preparations are recorded in the QA Sample logbook (Figure 3-1).



		Standard No. QAS
A type		
rep date	Prepared by	Verified by
		· · · · · · · · · · · · · · · · · · ·
		·
Parameters		
		
	<u> </u>	
Preparation method		Final vol

Figure 3-1. Standards preparation logbook

Calculations

	Sample Distribution								
Date	SAM No.	Client	Remarks						
									
									
									

Figure 3-1. (Cont.)



- An inventory of stock standards is maintained within the limits of published stability data. This decreases the time required for daily standard preparation.
- Duplicate samples are requested from clients. These are blind to the laboratory and the client is not billed for the duplicate.
- Blind QA samples are submitted through the Sample Control
 Center to all laboratories. The parameters and concentration
 levels are selected by the RAS Quality Assurance Coordinator.
- Laboratory managers submit, via a "QA Alert Form" (Figure 3-2). a list of the types of QA samples needed the following week. This insures that the parameters with which there have been problems are included in the sample.
- Monthly reports are issued from the RAS QA Coordinator (Fig. 3-3). These are submitted to the corporate QA Director, laboratory managers and Director of RAS. Managers are notified immediately of major problems with the results of analysis of a QA sample.
- The results of the program are summarized on a quarterly basis for Radian's management.

In addition to the continuous audit program, provisions for third party review are made with each client's work. Radian Analytical Services welcomes onsite audits, performance samples, and independent evaluations.



QA ALERT FORM

	QA standard for the week of
NPDES Form A water Form B water metals	RCRA metals pesticide OC OP herbicide
Form C water metals organics	EPA 601 624 602 625 B/N Acids A/N
тос тох	MS VOA GC VOA
Matrix requirements:	PCB
Concentration requirements:	
Special Standards/I	nstructions Individual Parameters
·	
	<u> </u>

Figure 3-2. QA alert form



ANALYTICAL SERVICES MONTHLY QA REPORT

QA	prep	report	for	the	month	of	
----	------	--------	-----	-----	-------	----	--

Order No.	Lab	Parameter	Certified Value	Analyzed Value	% Recovery	Date Reported
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	+				<u> </u>	
	1					
	<u> </u>					
	1		-			
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Figure 3-3. Monthly QA Report



3.1 Data Review and Validation

All analysis results are entered into the SAM computer system. Following completion of the analyses, a preliminary report is printed and returned to the appropriate laboratory manager for review and validation. A final report is printed after the certification by the manager. This report is signed and approved by the laboratory manager before being forwarded to the client. The following diagram (Fig. 3-4) illustrates the data flow for a typical sample analysis.

Upon completion of the analysis and before the final data are issued, the results of the QA audit samples are compared to the certified values. These results are plotted on control charts. Separate control charts are maintained for each analysis. If results are outside the accepted control limits, the analytical results are held until the problem is resolved.

3.2 Control Charts

Quality control charts are maintained for both accuracy and precision. Both charts are structured as shown in Figure 3-5. The main portions of the chart are the center line and the two control limits. The center line is the 100% or total recovery/total agreement of analytical results. The upper and lower control limits are calculated from historical data.

Control charts for accuracy are constructed as follows:

Precent recovery of standards (P_{ST}) :

 $P_{CT} = 100 \times \frac{\text{analyzed value}}{\text{certified value}}$

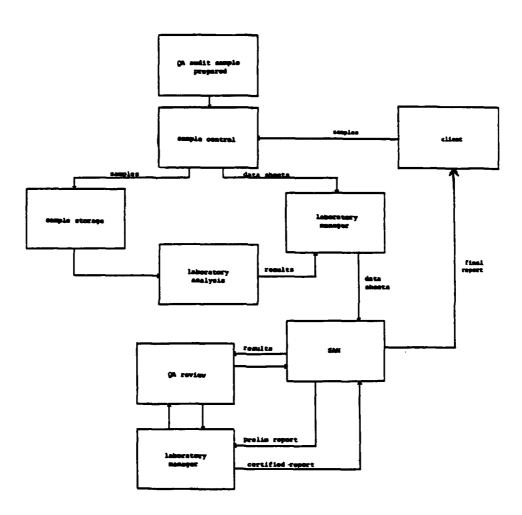


Figure 3-4. Data Flow

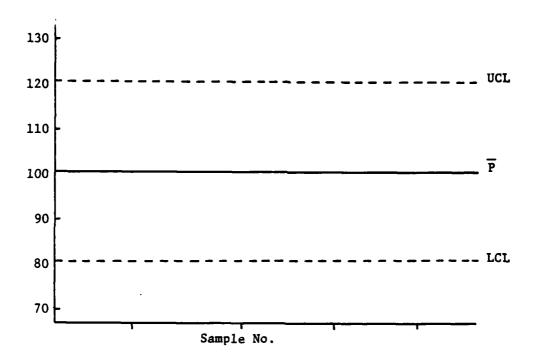


Figure 3-5. Control Chart



Percent recovery of spikes in samples (PSP):

From a set of analyses, the average percent recovery (\overline{F}) :

$$\overline{P} = \underbrace{\sum_{i=1}^{n} P_{i}}_{n}$$

The standard deviation for percent recovery (S_R) :

$$S_{R} = \sqrt{\sum_{i=1}^{n} P_{i}^{2} - \left(\sum_{i=1}^{n} P_{i}\right)^{2} / n}$$

The upper and lower control limits are therefore

$$UCL = \overline{P} + 3S_R$$

$$LCL = \overline{P} - 3S_R$$

An analysis is out of control when either of the two conditions apply:

- 1) Any results outside the control limits
- 2) Seven successive results on the same side of the control line.

Control charts for precision are also constructed. Precision is a function of the concentration range of the analyte. The closer the result is to the analytical detection limit, the more imprecise the data become on a percentage scale. Figure 3-6 illustrates the relationship between detection limit and precision for a typical methodology. Because of this concentration dependence, precision control charts need to be developed for specific concentration ranges for each analyte. For duplicate samples A and B, the ratio of the values of A and B are plotted.

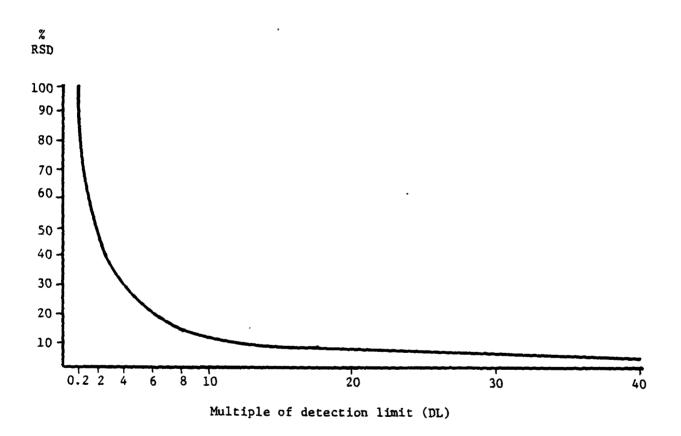


Figure 3-6. Relationship between Detection Limit and Precision



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3.3 <u>Concurrent Review</u>

Upon review of analytical results of QA audit samples, the QA Coordinator will schedule a meeting with the laboratory manager if there are any tests out of control or which are deviant from an expected precision/accuracy norm. The purpose of this meeting is to:

- review raw data and determine if there is an explanation for the deviance.
- outline analyses of quality control and/or quality assurance samples to further define the problem and its solution.
- establish a schedule for monitoring the analysis after a solution is implemented, to assure that the problem does not recur.

Involvement of the laboratory manager in the problem assessment and solution is essential to a mutual committment to a quality analytical laboratory.



APPENDIX G
Chain of Custody Forms



CHAIN OF CUSTODY RECORD

FIELD SAMPLE No. TSED-01 COMPANY SAMPLED/ADDRESS TINKER AFB SAMPLE POINT DESCRIPTION NORTH Side Cultion Valer Patrol Rd - 150' E of Pond Rd STREAM CHARACTERISTICS: TEMPERATURE _A/A VISUAL OBSERVATIONS/COMMENTS SANDY Red Clay DATE/TIME SAMPLED 19 JUNE 84 1040 COLLECTOR'S NAME GANGARE AMOUNT OF SAMPLE COLLECTED red clan sediment SAMPLE DESCRIPTION SALES STORE AT: AMBIENT 50 -10°C U TOTHER CAUTION - NO MORE SAMPLE AVAILABLE | RETURN ALL PORTIONS | RETURN UNUSED PORTION OF SAMPLE OTHER INSTRUCTIONS - SPECIAL HANDLING - HAZARDS __NONE HAZARDOUS SAMPLE (SEE BELOW) NON-HAZARDOUS SAMPLE ☐ Toxic Skin IRRITANT FLAMMABLE (FP 40°C) PYROPHOR IC LACHRYMATOR SHOCK SENSITIVE ACIDIC. BIOLOGICAL CARCINOGENIC - SUSPECT CAUSTIC PEROXIDE RADIOACTIVE OTHER SAMPLE ALLOCATION / CHAIN OF POSSESSION: ORGANIZATION NAME ____ DATE RECEIVED 6-20-84 MINIETUWANIS RECEIVED BY __ LAB SAMPLE NO. __ COMMENTS ___ INCLUSIVE DATES OF POSSESSION _ ORGANIZATION NAME _ _____ DATE RECEIVED _____ RECEIVED BY __ LAB SAMPLE NO. __ ____ COMMENTS __ INCLUSIVE DATES OF POSSESSION ORGANIZATION NAME ___ RECEIVED BY __ DATE RECEIVED _____ _____ COMMENTS _ LAB SAMPLE NO. __ INCLUSIVE DATES OF POSSESSION ___

CHAIN OF CUSTODY RECORD

	_	FIELD SAMPLE No. TSED 02			
COMPANY SAMPLED/ADDRESS TINKE	R AFB				
SAMPLE POINT DESCRIPTIONCOLON	Orack				
STREAM CHARACTERISTICS:		creekbed. Gravel bottom.			
COLLECTOR'S NAME SANCARE DATE/TIME SAMPLED 41984 1100 AMOUNT OF SAMPLE COLLECTED 1 SAMPLE DESCRIPTION CONTAGES OF 3 12 H deep place Store at: Ambient 5°C -10°C OTHER CAUTION - No more sample available Return all portions Return unused portion of sample					
HAZARDOUS SAMPLE (SEE BELOW)	PO Non-hazard	OUS SAMPLE			
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)			
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE			
☐ Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT			
CAUSTIC	PEROXIDE	RADIOACTIVE			
SAMPLE ALLOCATION / CHAIN OF POSSESS ORGANIZATION NAME RAS					
RECEIVED BY AUGUSTUS AND SAMPLE NO. 24406146-03	COMMENTS	DATE RECEIVED 6-20-84			
INCLUSIVE DATES OF POSSESSION					
ORGANIZATION HAME					
		DATE RECEIVED			
LAB SAMPLE No.	COMMENTS				
INCLUSIVE DATES OF POSSESSION					
ORGANIZATION NAME					
RECEIVED BY		DATE RECEIVED			
LAB SAMPLE No.	COMMENTS _				
INCLUSIVE DATES OF POSSESSION					

CHAIN OF CUSTODY RECORD

_		FIELD SAMPLE No. 15ED -03
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COMPANY SAMPLED/ADDRESS SAMPLE POINT DESCRIPTION CONTURE	<u> </u>	· · · · · · · · · · · · · · · · · · ·
SAPLE POINT DESCRIPTION		
STREAM CHARACTERISTICS:	1	,
EMPERATURE	FLOW	PH _ <i>N</i> /A
VISUAL OBSERVATIONS/COMMENTS	bottom Stream.	
		(1,9/2) 1/2 ::
	DATE/TIM	E SAMPLED 6/19/84 1/20
AMOUNT OF SAMPLE COLLECTED	colina 1 2	du Caraila Caral
SAMPLE DESCRIPTION Red Cun en	Sainer. 3	plugs from composite sample
STORE AT: AMBIENT STORE] -10°C [] OTHER	
CAUTION - NO MORE SAMPLE AVAILABLE	RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
— Other instructions - Special Hambling	+ HAZARDS	_
THER INSTITUTE OF ECIME IMMELING	1002000	
HAZARDOUS SAMPLE (SEE BELOW)	☑ Non- Haza	RDOUS SAMPLE
_	/~	
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
	_	
		
SAMPLE ALLOCATION / CHAIN OF POSSESSI	<u>on</u> :	
RECEIVED BY AME KAS		DATE RECEIVED 6-30-84
LAB SAMPLE NO. 3106166-08		DATE RECEIVED DO DY
LAB SAMPLE NO.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
AB SAMPLE NO	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		Date RECEIVED
INCLUSIVE DATES OF POSSESSION		

CHAIN OF CUSTODY RECORD

广泛

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124 (25) (31)

		FIELD SAMPLE No. 1500
COMPANY SAMPLED/ADDRESS TINKER	AFB	
SAMPLE POINT DESCRIPTION CRUTE	HO CREEK	
STREAM CHARACTERISTICS:	- ula	
TEMPERATURE	FLOW MANAGED DO	PH MIFE SHADED
VISUAL UBSERVATIONS/COMMENTS 5/5	CHAINEL N	WONLY VEC XVATEB.
COLLECTOR'S NAME GANCAR2 AMOUNT OF SAMPLE COLLECTED L		WE. SO' UPSTREAM TOWER R
STORE AT: AMBLENT 5°C		
CAUTION - NO MORE SAMPLE AVAILABLE		
_		
OTHER INSTRUCTIONS - SPECIAL HANDLIN	G - HAZARDS	
	·	
HAZARDOUS SAMPLE (SEE BELOW)	Non-hazardou	JS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	GHOCK SENSITIVE
Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
-		
SAMPLE ALLOCATION / CHAIN OF POSSESS ORGANIZATION NAME RAS	ION:	
RECEIVED BY AND THE RECEIVED BY		DATE RECEIVED 6 30 84
LAB SAMPLE NO 8406166-04	COMMENTS	DATE RECEIVED 9 700 01
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		
LAB SAMPLE NO.		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	



CHAIN OF CUSTODY RECORD

TSED-05
FIELD SAMPLE No.

COMPANY SAMPLED/ADDRESS TINKER	? AFB	
SAMPLE POINT DESCRIPTION CRUTE	HO CREEK	
STREAM CHARACTERISTICS: TEMPERATURE NAME VISUAL OBSERVATIONS/COMMENTS STRE	,	WGHLY VEE SHAPED
COLLECTOR'S NAME GANCARZ AMOUNT OF SAMPLE COLLECTED L SAMPLE DESCRIPTION CDARPOSITE	•	
SAMPLE DESCRIPTION		
CAUTION - No MORE SAMPLE AVAILABLE	E RETURN ALL PORTIONS	
HAZARDOUS SAMPLE (SEE BELOW)	X Non-hazard	OUS SAMPLE
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Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		
Sample Allocation / Chain of Possess Organization Name RAS Received by Taul Taulaya		DATE RECEIVED 620 54
LAB SAMPLE NO. <u>9406166-05</u>	COMMENTS _	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION HAME		
		DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No	COMMENTS _	
INCLUSIVE DATES OF POSSESSION		

CHAIN OF CUSTODY RECORD

_		FIELD SAMPLE No. TSED-06
COMPANY SAMPLED/ADDRESS TINKE	r AFB	
SAMPLE POINT DESCRIPTION TRIBU	TARY TO ELM CRE	EK. DRY CREEKBED
TREAM CHARACTERISTICS.	•	•
EMPERATURE	ELON NA	au <i>N/</i> 4
CRE	EX BOX TREV	
ISOAC OBSERVATIONS/COPPERIS	1	
OLLECTOR'S NAME GANCARY	DATE/TIME S	TAMPLED 6/19/8 4 1300
MOUNT OF SAMPLE COLLECTED / Z		
AMPLE DESCRIPTION COMPOSITE	of 1 12" PWF.	
TORE AT: AMBIENT 75°C		
CAUTION - NO MORE SAMPLE AVAILABLE		
CAUTION S NO HORE SAMPLE AVAILABI	TE KETOKN ALL PORTIONS	_ RETURN UNUSED PORTION OF SAMPLE
THER INSTRUCTIONS - SPECIAL HANDLII	ng - Hazards	
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardo	SAMPLE
Toxic	SKIN IRRITANT	FLANMABLE (FP 40°C)
Pyrophoric	LACHRYMATOR	SHOCK SENSITIVE
Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		
AMPLE ALLOCATION / CHAIN OF POSSES	: : : : : : : : : : : : : : : : : : :	
RGANIZATION NAME KAS.		
ECEIVED BY ALL MINES		DATE RECEIVED 6-20-8-
AB SAMPLE NO. 3406166604	COMMENTS	
NCLUSIVE DATES OF POSSESSION		
RGANIZATION NAME		
		DATE RECEIVED
AB SAMPLE No.		
	-	
NCLUSIVE DATES OF POSSESSION		
IRGANIZATION NAME		
		DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		<u></u>

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	_	FIELD SAMPLE No. 1300
COMPANY SAMPLED/ADDRESS TINKE	r AFB	
SAMPLE POINT DESCRIPTION CAUTE	o (reek	
STREAM CHARACTERISTICS:	5 N/A	au Aula
TEMPERATURE NA VISUAL OBSERVATIONS/COMMENTS DE	an Look in creek.	PH _ <i>N/A</i>
VISUAL USSERVATIONS/COMMENTS	AN SYMPH IM LACER.	
COLLECTOR'S NAME GAUCANZ	DATE/TIME S	AMBIED 6/19/87 18/1
AMOUNT OF SAMPLE COLLECTED/ &		AMPLED 6/19/87 /8/1
SAMPLE DESCRIPTION Sediment		
STORE AT: AMBIENT \$5°C		
	_	
CAUTION - No MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLE	ng - Hazards	·
		· · · · · · · · · · · · · · · · · · ·
		
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardo	US SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		
SAMPLE ALLOCATION / CHAIN OF POSSES	SION:	
ORGANIZATION NAMER	AS -	
RECEIVED BY	ane andres	DATE RECEIVED 6-21-84
LAB SAMPLE NO	11 / 1	
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ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	<u> </u>
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		DATE RECEIVED
LAB SAMPLE No.		
LAB UNITE IN	CUMMENTS	
INCLUSIVE DATES OF POSSESSION		



		FIELD SAMPLE No. 1361 -08
COMPANY SAMPLED/ADDRESS TINKE	n AFB	
SAMPLE POINT DESCRIPTION CONCLO	Track	
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STREAM CHARACTERISTICS:	- 14	4174
TEMPERATURE NAME NOTE NOTE NOTE NOTE NOTE NOTE NOTE NOT	FLOW MAY	PH W/A
/ISUAL OBSERVATIONS/COMMENTS	y youth ceases to	maye
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COLLECTOR'S NAME GOLLAND	DATE/TIME S	MPLED 6/19/04 /030
MOUNT OF SAMPLE COLLECTED		
SAMPLE DESCRIPTION Section		
STORE AT: AMBIENT 5°C	-10°C UTHER	
CAUTION - No MORE SAMPLE AVAILABLE	E RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
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OTHER INSTRUCTIONS - SPECIAL HANDLIF	IG - HAZARDS	
HAZARDOUS SAMPLE (SEE BELOW)	₩Non- HAZARDO	IIC CAMPI S
MAZARDOUS SAMPLE (SEE BELUW)	MINON-HAZARDO	
Toxic	Skin IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
□ Caustic .	PEROXIDE	RADIOACTIVE
	· ENONIBE	
OTHER		
SAMPLE ALLOCATION / CHAIN OF POSSESS	SION:	
ORGANIZATION NAME		
RECEIVED BY AND WHO	<u> </u>	DATE RECEIVED 6-3184
LAB SAMPLE NO		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME	<u>.</u>	
		DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE No.		
INCLUSIVE DATES OF POSSESSION		

	0	FIELD SAMPLE No. 15ED -03
COMPANY SAMPLED/ADDRESS	CR AFB	
SAMPLE POINT DESCRIPTION		fuel dor.
COLLECTOR'S NAME GONCORZ AMOUNT OF SAMPLE COLLECTED SAMPLE DESCRIPTION STORE AT: AMBIENT \$5°C	DATE/TIME S	AMPLED 6/19/84 1845
CAUTION - NO MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
HAZARDOUS SAMPLE (SEE BELOW)	∑ Non-hazardo	US SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
☐ Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
		·
SAMPLE ALLOCATION / CHAIN OF POSSES: ORGANIZATION NAME	retxy	DATE RECEIVED 6-21-84
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		
LAB SAMPLE NO.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		

	•	FIELD SAMPLE No. 1320 70	
COMPANY SAMPLED/ADDRESS TINKER AFB			
SAMPLE POINT DESCRIPTION KHUL	MAN CREEK		
STREAM CHARACTERISTICS:			
	FLOW NA	PH NA	
VISUAL OBSERVATIONS/COMMENTS CA	BELBED to BORDU	PH N/A C. ODOR OF JET FUEL	
COLLECTOR'S NAME GANCARE	DATE/TIME S	AMPLED 6/13/87 /930	
AMOUNT OF SAMPLE COLLECTED,			
SAMPLE DESCRIPTION Sediment	·		
STORE AT: AMBIENT 5°C	10°C OTHER		
CAUTION - NO MORE SAMPLE AVAILAB			
CAUTION - NO HORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS [RETURN UNUSED PORTION OF SAMPLE	
OTHER INSTRUCTIONS - SPECIAL HANDLI	ng - Hazards		
			
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HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardo	US SAMPLE	
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)	
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE	
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT	
CAUSTIC	PEROXIDE	RADIOACTIVE	
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Sample Allocation / Chain of Posses:	SION:		
ORGANIZATION NAME KAS	7v.	1.2144	
RECEIVED BY AND TOWN LAB SAMPLE NO. 3400190-04		DATE RECEIVED 12134	
LAB SAMPLE NO	COMMENTS		
Inclusive Dates of Possession			
INCLUSIVE DATES OF POSSESSION	····		
ORGANIZATION NAME	·		
RECEIVED BY		DATE RECEIVED	
LAB SAMPLE NO	COMMENTS		
INCLUSIVE DATES OF POSSESSION			
ORGANIZATION NAME			
		DATE RECEIVED	
LAB SAMPLE No.			
INCLUSIVE DATES OF POSSESSION			

_		FIELD SAMPLE No. 150717
COMPANY SAMPLED/ADDRESS TINKER	AFB	
SAMPLE POINT DESCRIPTION Soldier	Croek	
STREAM CHARACTERISTICS:	4//4	u la
TEMPERATURE	FLOW VIT	PH
VISUAL OBSERVATIONS/COMMENTS	recui of V- NOTCH	L W101
Cmu at 21		Clark 1 12 mm
COLLECTOR'S NAME COLLECTED 1	DATE/TIME	SAMPLED 6/10/8 F 10/00
AMOUNT OF SAMPLE COLLECTED	\	
SAMPLE DESCRIPTION Black Scal		
STORE AT: AMBIENT 5°C] -10°C	
CAUTION - No MORE SAMPLE AVAILABLE	RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
		-
OTHER INSTRUCTIONS - SPECIAL HANDLING	- HAZARDS	
		
- .	•••	
HAZARDOUS SAMPLE (SEE BELOW)	Mon-Hazari	OUS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
— ☐ Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
□ Other	· 	.
SAMPLE ALLOCATION / CHAIN OF POSSESSIC	<u>on</u> :	
ORGANIZATION NAME	124	7-2144
RECEIVED BY THE		DATE RECEIVED 6-2184
LAB SAMPLE No	COMMENTS _	
Inclusive Dates of Possession		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE NO.		
INCLUSIVE DATES OF POSSESSION		

		FIELD SAMPLE No. /SED-12
COMPANY SAMPLED/ADDRESS	AFB	
SAMPLE POINT DESCRIPTION	ier Greek	
STREAM CHARACTERISTICS:	•	
TEMPERATURE	FLOW NA	au NA
VISUAL OBSERVATIONS/COMMENTS CO	FLOW NAT TUST U	astrony of B-C-11200
VISUAL OBSERVATIONS/ COMPENTS 131	ATT CANAL CONTRACTOR	
COLLECTOR'S NAME SEUCA-72	DATE/TIME SAM	PLED 6/20/84 1030
AMOUNT OF SAMPLE COLLECTED	I	4
SAMPLE DESCRIPTION Red See	linent	
STORE AT: AMBIENT \$ 5°C		
CAUTION - NO MORE SAMPLE AVAILAS	_	
CAUTION - NO HORE SAMPLE AVAILAB	ILE RETURN ALL PORTIONS 1	RETURN UNUSED FORTION OF SAMPLE
Other instructions - Special Handli	ng - Hazards	
	<u> </u>	
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardous	SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
Pyrophoric	· LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
	· _	
		
Sample Allocation / Chain of Posses	<u>is Ion</u> :	
ORGANIZATION NAME ABOUTED NAME AND THE TOTAL	W/2	1-21-84
4 H-51 1/35 A		DATE RECEIVED 6-21-84
LAB SAMPLE NO	LOMMENTS	
INCLUSIVE DATES OF POSSESSION	_	
•		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE NO.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE No.		
INCLUSIVE DATES OF POSSESSION		

_		FIELD SAMPLE No. 150-13
COMPANY SAMPLED/ADDRESS TURE	AFB	
COMPANY SAMPLED/ADDRESS	as Condo	
SAMPLE POINT DESCRIPTION Soldi		
STREAM CHARACTERISTICS:	./.	4.
TEMPERATURE WA	FLOW NA	bert. PH NA
VISUAL OBSERVATIONS/COMMENTS	MIN STREET BY USE	wer c
Causes		4PLED 6/20/87 1100
COLLECTOR'S NAME THURST	DATE/TIME SAI	1PLED 47-987 1100
AMOUNT OF SAMPLE COLLECTED	Z T	
STORE AT: AMBIENT 5°C		
	-	
CAUTION - NO MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLI	ng - Hazards	
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardou	S SAMPLE .
Toxic	SKIN IRRITANT	FLANNABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC .	PEROXIDE	RADIOACTIVE
OTHER		
SAMPLE ALLOCATION / CHAIN OF POSSES	SION:	
ORGANIZATION NAME RAS		
RECEIVED BY	<u> 1842 — — — — — — — — — — — — — — — — — — —</u>	DATE RECEIVED 6-21-84
LAB SAMPLE NO	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
INCLUSIVE DATES OF TUSSESSION		
ORGANIZATION NAME	=	
		DATE RECEIVED
LAB SAMPLE NO	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY	_	DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		

CHAIN OF CUSTODY RECORD

	4.00	FIELD SAMPLE No. 1SED - 14
COMPANY SAMPLED/ADDRESS LUREY	AFB	
SAMPLE POINT DESCRIPTION CONTUE	uce O Soldion Che	eR
STREAM CHARACTERISTICS: TEMPERATURE		PH
COLLECTOR'S NAME SUCCES 3 AMOUNT OF SAMPLE COLLECTED SAMPLE DESCRIPTION ROLL STORE AT: AMBIENT 5°C CAUTION - NO MORE SAMPLE AVAILABLE OTHER LINESPURCE OF SAMPLE AVAILABLE	-10°C OTHER	
OTHER INSTRUCTIONS - SPECIAL HANDLII	NG - HAZARDS	
HAZARDOUS SAMPLE (SEE BELOW)	Mon-hazardou	S SAMPLE
Toxic	∠ SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC		SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		:_i
SAMPLE ALLOCATION / CHAIN OF POSSESS ORGANIZATION NAME	emidizy	DATE RECEIVED L-21-84
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		

THE RESIDENCE OF THE PROPERTY
		FIELD SAMPLE No. 1SED - 15
COMPANY SAMPLED/ADDRESS LURES	AFB	
SAMPLE POINT DESCRIPTION Sol	lier Creek	
STREAM CHARACTERISTICS:	- 4/4	la
TEMPERATURE	FLOY (VI)	PH N/A-
VISUAL UBSERVATIONS/COMMENTS	MANY MANY	Chamel.
Comments Name Garage		SAMPLED 6/20/84 1200
COLLECTOR'S NAME SAUCUS	DATE/TIME S	SAMPLED GADIST 1200
AMOUNT OF SAMPLE COLLECTED SAMPLE DESCRIPTION	1	
STORE AT: AMBIENT 5°C		
CAUTION - NO MORE SAMPLE AVAILABLE	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLIS	ig - Hazards	
		
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardo	DUS SAMPLE
Toxic	Skin IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
Caustic	PEROXIDE	RADIOACTIVE
OTHER		
SAMPLE ALLOCATION / CHAIN OF POSSESS	LION:	
ORGANIZATION NAME RA		
RECEIVED BY AND THE AND	V)	DATE RECEIVED 6-2184
LAB SAMPLE NO	/ \	DATE SECTION CONTRACTOR
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		

CHAIN OF CUSTODY RECORD

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		FIELD SAMPLE No. TSED-16
COMPANY SAMPLED/ADDRESS Tinke	1 AFB	
Sample Point Description Salell	on Creek	
STREAM CHARACTERISTICS: TEMPERATURE		PH N/N
COLLECTOR'S NAME TOUCHS	DATE/TIME	SAMPLED 6/20/84 1240
SAMPLE DESCRIPTION Section	☐ -10°C	
STORE AT: AMBIENT 5°C		
CAUTION - NO MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLI	ng - Hazards	
		
HAZARDOUS SAMPLE (SEE BELOW)	Non-HAZARD	OUS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		
Sample Allocation / Chain of Posses:	S I ON •	
ORGANIZATION NAME RAS	~ .	
RECEIVED BY	ne Thindoly	DATE RECEIVED 6-21-84
LAB SAMPLE NO	COMMENTS _	•
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
		·
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		

		FIELD SAMPLE No. ISED-17
COMPANY SAMPLED/ADDRESS Tinker	AFB	
SAMPLE POINT DESCRIPTION ATLA	D	
STREAM CHARACTERISTICS:	- 4/4	
TEMPERATURE	FLOW NA	PH
VISUAL OBSERVATIONS/COMMENTS	ary.	
COLLECTOR'S NAME COLLECTED AMOUNT OF SAMPLE COLLECTED SAMPLE DESCRIPTION	DATE/TIME SA	MPLED 6/20/84 /300
STORE AT: AMBIENT \$5°C	□ -10°C □ 0THER	
/~		
CAUTION - NO MORE SAMPLE AVAILABI	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLII	ng - Hazards	
		
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardou	S SAMPLE
Toxic ·	SKIN IRRITANT	FLAMMABLE (FP 40°C)
Pyrophoric	LACHRYMATOR	SHOCK SENSITIVE .
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
Caustic	PEROXIDE	RADIOACTIVE
Sample Allocation / Chain of Possess	S LON •	
ORGANIZATION NAME RAS	ativit.	
RECEIVED BY MUTH	Udan	DATE RECEIVED 10-21 34
LAB SAMPLE No. 940690-12		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE NO.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		

CHAIN OF CUSTODY RECORD

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		FIELD SAMPLE No. ISED 18
COMPANY SAMPLED/ADDRESS TWA	w AFB	
SAMPLE POINT DESCRIPTION	Lier Creek	
STREAM CHARACTERISTICS:	•	
EMPERATURE NA	From 11/4-	pH 11/2-
ISUAL OBSERVATIONS/COMMENTS A		
COLLECTOR'S NAME COUCOUS	DATE/TIME S.	MPLED 6/20/84 1400
COLLECTOR'S NAME	il	77-
SAMPLE DESCRIPTION Sediuli	T	
STORE AT: AMBIENT 75°C		
CAUTION - NO MORE SAMPLE AVAILAB	I E PETIEN ALL POPTIONS	T PETURN HIMIEER ROBTION OF CAMPIE
-		THE TORK UNUSED PORTION OF SAMPLE
THER INSTRUCTIONS - SPECIAL HANDLE	ng - Hazards	
	······································	
	<u></u>	· · · · · · · · · · · · · · · · · · ·
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardo	US SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
Pyrophoric	LACHRYMATOR-	GHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
	· _	<u> </u>
_		
AMPLE ALLOCATION / CHAIN OF POSSES	SION:	
RGANIZATION NAME	TH days	DATE RECEIVED 6-2184
AB SAMPLE NO. 3406190-11		
AB SAMPLE NO		
NCLUSIVE DATES OF POSSESSION		
RGANIZATION NAME		DATE RECEIVED
		DATE RECEIVED
AS SAFFLE NO.		
NCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		Date Received
		
NCLUSIVE DATES OF POSSESSION		

THE REPORT OF THE PROPERTY OF

		FIELD SAMPLE No. SED - 15
COMPANY SAMPLED/ADDRESS JULE	R AFB	
SAMPLE POINT DESCRIPTION CRUTCHE	COLARK	
SAMPLE POINT DESCRIPTION CALUICING		
STREAM CHARACTERISTICS	.1 4	.1.
TEMPERATURE NATIONS/COMMENTS MULL	FLOWNIT	PH <u>N/A</u>
VISUAL OBSERVATIONS/COMMENTS MUC	H FOAM DOWNSTREAM	OF WEIR
- 1 " (=A)(A) 2-	D. G 0	(10-10+ 1/20
COLLECTOR'S NAME	VATE/IIME S	AMPLED 6/20/8 + 1630
AMOUNT OF SAMPLE COLLECTED 1		
STORE AT: AMBIENT TO 5°C		
CAUTION - NO MORE SAMPLE AVAILABI	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLII	ng - Hazards	
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardo	US SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
Caustic	PEROXIDE	RADIOACTIVE
OTHER		
SAMPLE ALLOCATION / CHAIN OF POSSES	SION:	
ORGANIZATION NAME RAS		
RECEIVED BY WILLIAM	<i>(</i>)	DATE RECEIVED 6-22-84
LAB SAMPLE NO	(/ \ <u>C</u>)	
f		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
_		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	<u> </u>
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		

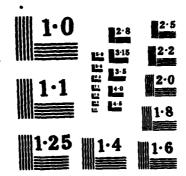
		FIELD SAMPLE No. 13ED 20
COMPANY SAMPLED/ADDRESS TINKER	? AFB	
SAMPLE POINT DESCRIPTION CRUTE	HO CREEK	
EMPERATURE ALA	FLOW NA	PH NA
VISUAL OBSERVATIONS/COMMENTS DI	film on susface	
Stream Characteristics: Temperature		
COLLECTOR'S NAME GANCARE	DATE/I IME SAMP	LED 6/21/84 0720
AMOUNT OF SAMPLE COLLECTED		
SAMPLE DESCRIPTION SEDIMENT		
STORE AT: AMBIENT X 5°C	-10°C OTHER	
CAUTION - NO MORE SAMPLE AVAILABLE		ETHON HMISER BOOTTON OF CAMBIE
CAUTION - NO HORE SAFFLE AVAILABLE	LE CONTROLL PORTIONS	EIDEN UNUSED FOR LUN OF SAMPLE
Other Instructions - Special Handli	ig - Hazards	···
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardous	SAMPLE
7 Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT
_		_
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		
SAMPLE ALLOCATION / CHAIN OF POSSESS	<u> </u>	
ORGANIZATION NAME KAS	-	
RECEIVED BY	NOU	DATE RECEIVED 6-32 34
LAB SAMPLE NO.	COMMENTS	neem
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME	·	<u> </u>
RECEIVED BY		
LAB SAMPLE No.		
INCLUSIVE DATES OF POSSESSION		



_		FIELD SAMPLE No. 1500
COMPANY SAMPLED/ADDRESS TINKE	CR AFB	
SAMPLE POINT DESCRIPTION	NO CAGEK	
STREAM CHARACTERISTICS:	ed A	/.
TEMPERATURE U/A VISUAL OBSERVATIONS/COMMENTS NE	FLOW N/A	PH
VISUAL OBSERVATIONS/COMMENTS <u>A/E</u>	AR LANDFILL	
- CANCADA		Mayled Agen
COLLECTOR'S NAME GANGARZ AMOUNT OF SAMPLE COLLECTED 1	DATE/TIME SA	MPLED 44184 BEOO
SAMPLE DESCRIPTION	<u> </u>	
STATE OF AMERICA		
STORE AT: AMBIENT 5°C	OTHER	
Caution - No more sample available	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLI	ng - Hazards	
	·	
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardou	S SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C).
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
Caustic	PEROXIDE	RADIOACTIVE
OTHER		·
Sample Allocation / Chain of Posses:	S LON •	
ORGANIZATION NAMERAS		
RECEIVED BY SOUL TOUR	lxux	DATE RECEIVED 6-22 34
LAB SAMPLE NO. <u>4406206-0</u> 2	COMMENTS	
	\sim	
Inclusive Dates of Possession		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE No.		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE NO.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		····

_	_	FIELD SAMPLE No. 75ED -11
COMPANY SAMPLED/ADDRESS TINK	CR APB	
COMPANY SAMPLED/ADDRESS CRUCK SAMPLE POINT DESCRIPTION CRUCK HD CREEK		
STREAM CHARACTERISTICS: TEMPERATURE		PH M A
VISUAL UBSERVATIONS/COMMENTS 432	TVCK DAW	
COLLECTOR'S NAME SANCAR? AMOUNT OF SAMPLE COLLECTED SAMPLE DESCRIPTION	·	SAMPLED 6/21/84 0900
STORE AT: AMBIENT 5°C		
Caution - No more sample available Other instructions - Special Handlin	_	_
HAZARDOUS SAMPLE (SEE BELOW)	Non-hazard	OUS SAMPLE
Toxic	SKIN IRRITANT	FLANNABLE (FP 40°C)
Pyrophoric	LACHRYMATOR	GHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
Caustic OTHER	PEROXIDE	RADIOACTIVE
SAMPLE ALLOCATION / CHAIN OF POSSESS ORGANIZATION NAME RATE RECEIVED BY SHOW ACCORD	ndry	DATE RECEIVED 6 32 84
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE NO.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		

INSTALLATION RESTORATION PROGRAM PHASE II
CONFIRMATION/QUANTIFICATION STA. (U) RADIAN CORP AUSTIN
TX R M BAUER ET AL. OCT 85 RAD-85-212-027-21-03-VOL-2
F33615-83-D-4001 F/G 13/2 AD-A162 911 3/6 UNCLASSIFIED NL



COLORGO SECUENCE SPRINGER

NATIONAL BUREAU OF STANDARDS
MICROGOPY RESOLUTION TEST CHART

THE PRESENCE PROJECTS STOPPING SOUTH

وسن		FIELD SAMPLE No. 1500 23
COMPANY SAMPLED/ADDRESS	ar AFB	
SAMPLE POINT DESCRIPTION	TURO CREEK-	
STREAM CHARACTERISTICS:		
	Fine W/A	au Ma
TEMPERATURE	R OF PHENOL	
COLLECTOR'S NAME GANCARZ	DATE/TIME S	SWIPLED 6/11/84 1000
AMOUNT OF SAMPLE COLLECTED/	<u> </u>	· · · · · · · · · · · · · · · · · · ·
SAMPLE DESCRIPTION _SEDIMEN	7	
STORE AT: AMBIENT 5°C	10°C OTHER	
CAUTION - No MORE SAMPLE AVAILABLE	E RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
		_
OTHER INSTRUCTIONS - SPECIAL HAMDLIN	6 - MAZARUS	
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardo	DUS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
Pyrophoric	LACHRYMATOR	SHOCK SENSITIVE
Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		
Sample Allocation / Chain of Possess	ION:	
ORGANIZATION NAME RAS -		
RECEIVED BY ANG JUNE	Us.	DATE RECEIVED 6-22-84
LAB SAMPLE No.	COMMENTS	lineren
		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION HAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE NO.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
		WHIE RECEIVED
INCLUSIVE DATES OF POSSESSION		



SOCIAL BOOKS OF SOCIAL AND SOCIAL

CHAIN OF CUSTODY RECORD

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		FIELD SAMPLE No. 1>ED-ZY
COMPANY SAMPLED/ADDRESS TINK	ER APB	
COMPANY SAMPLED/ADDRESS TINKS SAMPLE POINT DESCRIPTION CRUTS	LHO CREEK	
Stream Characteristics: TemperatureAA	FLOW	-u .// -
VISUAL OBSERVATIONS/CONNENTS		PH
VISUAL USSERVATIONS/CONTENTS	JULY DE LO	
CANCAL CANCAL	22 Name/Time S	WALED 6/21/84 1130
AMOUNT OF SAMPLE COLLECTED	UATE/TIME S	wites was a series of the seri
SAMPLE DESCRIPTION SEDIME		
STORE AT: AMBIENT 5°C		
		7.0
CAUTION - NO HORE SAMPLE AVAILAB	LE KETURN ALL PORTIONS	KETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLE	ng - Hazards	
		
		 -
HAZARDOUS SAMPLE (SEE BELOM)	X, Non-hazardo	US SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT
_		—
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		
SAMPLE ALLOCATION / CHAIN OF POSSES	SION:	
ORGANIZATION NAME RAS		
RECEIVED BY	dir	DATE RECEIVED 6-12-54
LAB SAMPLE NO. <u>3406306-0</u> 4	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME	···	
		DATE RECEIVED
LAB SAMPLE NO.		
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		

	4-0	FIELD SAMPLE No. 1500 27
COMPANY SAMPLED/ADDRESS	KER AFB	
SAMPLE POINT DESCRIPTIONCRU1	TCHO CKEEK	
STREAM CHARACTERISTICS: TEMPERATURE	FLOW NA	BOTTOM.
COLLECTOR'S NAME	uT	
STORE AT: AMBIENT 5°C	10°C OTHER	
CAUTION - NO MORE SAMPLE AVAILAB	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLE	NG - HAZAROS	
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardou	IS SAMPLE
Toxic	Skin irritant	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		
SAMPLE ALLOCATION / CHAIN OF POSSESS ORGANIZATION NAME		
RECEIVED BY	xy	DATE RECEIVED 6 13 34
LAB SAMPLE NO. <u>84863206-06</u>	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
RECEIVED BY		
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME	·	
		DATE RECEIVED
LAS SAMPLE NO.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		

CHAIN OF CUSTODY RECORD

No.

COMPANY SAMPLED/ADDRESS	AFR	FIELD SAMPLE No. 1580 26
SAMPLE POINT DESCRIPTION CRUTC	HO CREEK	
STREAM CHARACTERISTICS: TEMPERATURE		
COLLECTOR'S NAME SANCAR'S MOUNT OF SAMPLE COLLECTED L SAMPLE DESCRIPTION SEDIME	DATE/TIME	SAMPLED 42187 1300
STORE AT: AMBIENT 5°C	☐-10°C ☐ OTHER	
•	LE RETURN ALL PORTIONS	RETURN UNUSED PORTION OF SAMPLE
HAZARDOUS SAMPLE (SEE BELOW)	Mon-hazari	DOUS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
Pyrophoric	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		
RECEIVED BY	• •	DATE RECEIVED 67284
ab Sample No. <u>\$406806-0</u>		
NCLUSIVE DATES OF POSSESSION		
REGANIZATION NAME	. <u> </u>	
ECEIVED BY		DATE RECEIVED
AB SAMPLE No.	COMMENTS	
NCLUSIVE DATES OF POSSESSION		
DREAMIZATION NAME		
RECEIVED BY		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		

RADIAN	CHAIN OF CUSTODY RECORD	
		FIELD SAMPLE No. TSED
COMPANY SAMPLED/ADDRESS TINK	ER AFB	
SAMPLE POINT DESCRIPTION _KHU	LMAN CREEK	
STREAM CHARACTERISTICS:		
TEMPERATURE NA	FLOW MA	PH MA
TEMPERATURE NA REPORTED NA PROPERTE NA PRO	FILM, MUSKPAT	
		11 10 100
COLLECTOR'S NAME	DATE/TIME SAMP	res 6/21/84 /330
AMOUNT OF SAMPLE COLLECTED	<u></u>	
SAMPLE DESCRIPTION SEDIMEN		
STORE AT: AMBIENT 5°C	10°C OTHER	
CAUTION - No MORE SAMPLE AVAILABI	LE RETURN ALL PORTIONS R	ETURN UNUSED PORTION OF SAMPL
OTHER INSTRUCTIONS - SPECIAL HANDLIS	ne - Hazards	
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardous	SAMPLE
Toxtc	SKIN IRRITANT	FLANNABLE (FP 40°C
☐ Pyrophoric		SHOCK SENSITIVE
☐ Acibic	☐ BIOLOGICAL	CARCINOGENIC - SUS
☐ CAUSTIC	PEROXIDE	RADIOACTIVE
☐ OTHER	Chokes	
OTHER		
SAMPLE ALLOCATION / CHAIN OF POSSESS	SION:	
ORGANIZATION NAME RAS	_	nars assessment 1284
ORGANIZATION NAME RAS	trus	•
ORGANIZATION NAME RAS	trus	,
ORGANIZATION NAME RAS	COMMENTS	
RECEIVED BY THE LAB SAMPLE NO	COMMENTS	
ORGANIZATION NAME RECEIVED BY THE TOWN TO THE LAB SAMPLE NO. 4 TOWN TO THE LAB SAMPLE NO. 4 TOWN TOWN THE TOWN	COMMENTS	
RECEIVED BY THE LAB SAMPLE NO	COMMENTS	DATE RECEIVED
ORGANIZATION NAME RECEIVED BY THE TOTAL SAMPLE NO. STOCKNOW OF THE TOTAL SAMPLE NO. STOCKNOW OF THE TOTAL SAMPLE NO. SAMPLE NO. SAMPLE NO. SAMPLE NO.	COMMENTS	DATE RECEIVED
ORGANIZATION NAME RECEIVED BY THE TOTAL SAMPLE NO. STOCKNOW OF THE TOTAL SAMPLE NO. STOCKNOW OF THE TOTAL SAMPLE NO. SAMP	COMMENTS	DATE RECEIVED
ORGANIZATION NAME RECEIVED BY LAB SAMPLE NO. STOU 200 - C INCLUSIVE DATES OF POSSESSION ORGANIZATION NAME RECEIVED BY LAB SAMPLE NO.	COMMENTS	DATE RECEIVED
ORGANIZATION NAME RECEIVED BY LAB SAMPLE NO	COMMENTS	DATE RECEIVED
ORGANIZATION NAME RECEIVED BY LAB SAMPLE NO	COMMENTS	DATE RECEIVED
ORGANIZATION NAME RECEIVED BY LAB SAMPLE NO	COMMENTS	DATE RECEIVED
ORGANIZATION NAME RECEIVED BY LAB SAMPLE NO. STOURD COMMENTATION HAME RECEIVED BY LAB SAMPLE HO. INCLUSIVE DATES OF POSSESSION ORGANIZATION NAME RECEIVED BY ORGANIZATION NAME RECEIVED BY	COMMENTS	DATE RECEIVED

CHAIN OF CUSTODY RECORD

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		FIELD SAMPLE No. TSED 28
COMPANY SAMPLED/ADDRESS TINE	CER AFB	
SAMPLE POINT DESCRIPTION AREA	<u> </u>	
STREAM CHARACTERISTICS:	,	4
TEMPERATURE NA	FlowNA	PH
VISUAL OBSERVATIONS/COMMENTS _DR	Y, HARD SOIL.	SAMPLED 6/21/84 /400
COLLECTOR'S NAME GANCARE	DATE/TIME	SAMPLED 6/21/84 /400
MIDDRE OF SAMPLE COLLECTED		
SAMPLE DESCRIPTION <u>SET IMEN</u>		
STORE AT: AMBIENT 5°C	10°C OTHER	
CAUTION - No MORE SAMPLE AVAILABL	LE RETURN ALL PORTIONS [RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLIN	ig - Hazards	
	 	
HAZARDOUS SAMPLE (SEE BELOW)	MON-HAZARDI	DUS SAMPLE
Toxic	SKIN IRRITANT	FLAMMBLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
Acidic	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
OTHER		
SAMPLE ALLOCATION / CHAIN OF POSSESS	ION:	
DREANIZATION NAME KAS	1000	1 22 04
RECEIVED BY AME THE	(U:U)	DATE RECEIVED 6-22-84
LAB SAMPLE No.	COMMENTS	17 WKUM
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		

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		Field Sample No. 7F, 6D, 66
Company Sampled Address TINKS Sample Point Description Manifor	ER AFB OKLAHOUA	
Sample Point Description MONITOR	Weus 7F,60,66	
Stream Characteristics:		. 4.
•	Flow	pH_ <i>MA</i>
Visual Observations/Comments		
Collector's Name NANCY STEIN	/ Date/Time Sample	1/16/84 7/17/8X
Amount of Sample Collected		
Sample Description WELL WATER		
Store at: Ambient 35°C -	10°C 🗆 Other	
Acquites No man assets available		
Caution - No more sample available		Discard unused portions
Other Instructions - Special Handling -	Hazards <u>AINNE</u>	
· · · · · · · · · · · · · · · · · · ·		
		· · · · · · · · · · · · · · · · · · ·
☐ Hazardous sample (see below)	Non-hazar	rdous sample
☐ Toxic	Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	□ Shock sensitive
LJ Acidic	☐ Biological	☐ Carcinogenic · suspect
□ Caustic	□ Peroxide	□ Radioactive
C) Other		
Sample Allocation/Chain of Possessio	n:	
Organization NameRAS		
Received By	Date Received	7-18-84 Time 11.00
Transported By 714.50		7090
Comments		
Inclusive Dates of Possession		
Organization Name		
Received By	Date Received	Time
Transported By		
Comments	· · · · · · · · · · · · · · · · · · ·	
Inclusive Dates of Possession		
Organization Name		
Received By		
Transported By		
Comments	•	
Inclusive Dates of Possession		



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_		Fleid Sample No. 64, B. C. 7F
Company Sampled / Address 11 N K	ER AFB	
Sample Point Description WELL	DATER	
Stream Characteristics:	. 1.	
Temperature	Flow	pH
Visual Observations/CommentsA/L	WE	
Collector's Name NANCY STE	IN, Date/Time Se	moled 7/17/84 - 7/18/84
Amount of Sample Collected X VD/	1/5178	
Sample Description <u>EPA 601</u>	<u>(</u>	
Store at: Ambient 75°C -	10°C 🗆 Other	
Caution - No more sample available	☐ Return unused portion of sa	ample Discard unused portions
C Other instructions - Special Handling -		
☐ Hazardous sample (see below)	Non-l	hazardous sample
∐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
Li Acidic	□ Biological	☐ Carcinogenic - suspect
□ Caustic	☐ Peroxide	☐ Radioactive
□ Other		
Sample Allocation/Chgin of Possessio	n:	
Organization Name RAS		
Received By	Date Rece	
Transported By	Lab Sample No,	3407112
Comments	7 F MOT received	
inclusive Dates of Possession		
Organization Name		
		lved Time
Transported By		
Comments		
Organization Name		tund —
•		ived Time
Comments	•	
Inclusive Dates of Possession		



C

		Field Sample No. 15ED - 20
Company Sampled Address TINK	or AFB	
Sample Point Description	CRECK	
Stream Characteristics:	•	,
Temperature NK	Flow ///	pH _ <i>N/A</i>
Visual Observations/Comments	put	
Collector's Name GANCARZ	Note/Time Same	pled 7/17/84
Amount of Sample Collected		
Sample Description SEDIMENT		
Store at: Ambient \$05°C -	10°C	
☐ Caution • No more sample available	☐ Return unused portion of same	ple Collecard unused portions
Other Instructions - Special Handling -	Hazards	
☐ Hazardous sample (see below)	M Non-haz	zerdous sample
☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric		☐ Shock sensitive
∐ Acidic	□ Biological	☐ Carcinogenic - suspect
☐ Caustic	☐ Peroxide	□ Radioactive
Other		
Sample Allocation/Chain of Possessio	n:	
Organization Name RAS -		
Received By AW KMASUS	Date Receive	1-20-84 Time 10:00
Transported By UFLAGN	Lab Sample No	407113-01
Comments	,	· · · · · · · · · · · · · · · · · · ·
Inclusive Dates of Possession		
Organization Name		
Received By	Date Receive	od Time
Transported By		
Comments	· · · · · · · · · · · · · · · · · · ·	······································
Inclusive Dates of Possession		
Organization Name		
Received By		
Transported By		
Comments		
Inclusive Dates of Possession		



	F	leid Sample No. $15ED-23$
Company Sampled / Address Tink	_	
Company Sampled Address <u>1706</u> Sample Point Description <u>CRUTCH</u>	CREEK	
Stream Characteristics;	,	A
Temperature NA	Flow N/4	ph _ <i>N/4</i>
Visual Observations/Comments <u>/////</u>	<u> </u>	
Collector's Name D GANCARZ	Date/Time Sampled	1/19/84
Amount of Sample Collected		
Sample Description <u>SEDINENT</u>	·	
Store at: 🗆 Ambient 🖂 🖰 🗀 🕳	10°C 🗆 Other	
☐ Caution - No more sample evailable	☐ Return unused portion of sample	A Discard unused portions
Other Instructions - Special Handling -	Hazarda	
□ Hazardous sample (see below)	X Non-hazardo	us sample
□ Toxic	Skin irritant	☐ Flammable (FP< 40°C)
⊇ Pyrophoric	L] Lachrymator	☐ Shock sensitive
∐ Acidic	□ Biologicai	☐ Carcinogenic - suspect
□ Caustic	□ Peroxide	□ Radioactive
☐ Other		
Sample Allocation/Chain of Possessic	n:	
Organization Name <u>KAS</u> -		
Received By	Date Received	-30-84 Time 10:00
Transported By 91491	Lab Sample No	1113.02
Comments	<u> </u>	
nclusive Dates of Possession		
Organization Name		
	Date Received	
Fransported By	Lab Sample No	
nclusive Dates of Possession	·	
	Date Received	
	Lab Sample No	
Comments		
nclusive Dates of Possession		



A CONTRACTOR CONTRACTO

_		Field Sample No. 1SED 28
Company Sampled Address TINK	ER AFB	
Sample Point Description AREA	D	
Stream Characteristics:		1.
Temperature MA	Flow Mt	pH _ <i>N/A</i>
Visual Observations/Comments		
Collector's Name GANCAR2	Date/Time Samp	led 7/19/84
Sample Description SEDIMENT		
Store at: Ambient \$5°C -	10°C	
•		
☐ Caution - No more sample available	☐ Return unused portion of samp	le LADiscard unused portions
Other instructions - Special Handling -	Hazards	
☐ Hazardous sample (see below)	A Non-haz	ardous sample
□ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
L] Acidic	☐ Biological	☐ Carcinogenic · suspect
☐ Caustic	☐ Peroxide	□ Radioactive
□ Other		
Sample Allocation/Chajn of Possession	on:	
Organization Name KAS -		
Received By AMUNION	Date Receive	d 7-20-84 Time 10.00
Transported By 710 4	Leb Semple No	407113-03
Comments	<u> </u>	
Inclusive Dates of Possession		
Organization Name		
Received By	Date Receive	d Time
Transported By		
Comments		
Inclusive Dates of Possession		
Organization Name		
Received By	Date Receive	d Time
Transported By	Lab Sample No	
Comments		
Inclusive Dates of Possession		



OC, CD, 6E, 6F, 66 FIELD SAMPLE No. 7A, 7C, 7F, 2A

COMPANY SAMPLED/ADDRESS TINKER	AFB, OK	1120 000 100 1100
SAMPLE POINT DESCRIPTION MOUNTA		
STREAM CHARACTERISTICS: TEMPERATURE	FLOW NA	PH MA
COLLECTOR'S NAME NAME STELL AMOUNT OF SAMPLE COLLECTED 2 VOI SAMPLE DESCRIPTION WELL WITTER STORE AT: AMBIENT 5°C CAUTION - No HORE SAMPLE AVAILABLE OTHER INSTRUCTIONS - SPECIAL HANDLIN		
HAZARDOUS SAMPLE (SEE BELOW)	Non-Hazardou	S SAMPLE
Toxic	Skin irritant	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
	· -	
SAMPLE ALLOCATION / CHAIN OF POSSESS ORGANIZATION NAME		DATE RECEIVED 8-1-84
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE No.	COMMENTS	
INCLUSIVE DATES OF POSSESSION		

6A,6B,6D,66

		Field Sample No
Company Sampled / Address USA	·F	
Company Sampled/Address	er Afb, OK	
Streem Characteristics:	Flow N/A	pH ~/*
Temperature	WE THE	
Collector's Name NANCY ST Amount of Sample Collected 2 VOA Sample Description	EIN Date/Time Sampled	8/1/8 4
Amount of Sample Collected 2 VOA	EACH SITE	
Semple Description		
Store at: Ambient 56°C -	10°C 🗆 Other	
· · · · · · · · · · · · · · · · · · ·		
Caution - No more sample available		☐ Discard unused portions
/ Other Instructions - Special Handling -	Hazards NONE	
CO. Character of the control of the	<i>Q</i>	lous sample
☐ Hazardous sample (see below)	_________\	•
☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
∐ Acidic	☐ Biological	☐ Carcinogenic - suspect
□ Caustic	☐ Peroxide	□ Radioactive
□ Other		
Sample Allocation/Chain of Possession	m:	
Organization Name 9A2-		
Received By SMUTANA	Un Date Received	8-2-84 Time 11:15
Transported By UALAGN	Lab Sample No. 840	0502O
Comments	<u> </u>	
Inclusive Dates of Possession		
Organization Name		
Received By	Date Received	Time
Transported By	Lab Sample No	
Comments	-	
Inclusive Dates of Possession	· —	
Organization Name		
Received By		Time
Transported By		
Comments	•	

CHAIN OF CUSTODY RECORD

.1		FIELD SAMPLE NO 10 1/4
COMPANY SAMPLED/ADDRESS USA	F	
SAMPLE POINT DESCRIPTION TINK	ER AFB OKL	AHOUA
STREAM CHARACTERISTICS:	•	
	FLON	PH
VISUAL OBSERVATIONS/COMMENTS _# # 1	VK T	
COLLECTOR'S NAME GANCAR 2	DATE/TIME	SAMPLED 8/14/84 - 8/15/84
AMOUNT OF SAMPLE COLLECTED 2 10	A VIAL EACH ST	TE
SAMPLE DESCRIPTION EPA 60		
STORE AT: AMBIENT \$5°C	10°C OTHER	
_		RETURN UNUSED PORTION OF SAMPLE
OTHER INSTRUCTIONS - SPECIAL HANDLE	NG - HAZAROS <u>NOUE</u>	
		
TI HATABOUR CAMBUR (CER DELCU)		
HAZARDOUS SAMPLE (SEE BELOW)	Non-HAZAR	DOUS SAMPLE
Toxic	SKIN IRRITANT	FLAMMABLE (FP 40°C)
PYROPHORIC	LACHRYMATOR	SHOCK SENSITIVE
ACIDIC	BIOLOGICAL	CARCINOGENIC - SUSPECT
CAUSTIC	PEROXIDE	RADIOACTIVE
SAMPLE ALLOCATION / CHAIN OF POSSES DESCRIPTION NAME	SION:	
RECEIVED BY	WARIA	DATE RECEIVED 8-16-84
LAB SAMPLE No.	STOBIE ZONNENTS	DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		
ORGANIZATION NAME		
		DATE RECEIVED
LAB SAMPLE No.	-	
		
INCLUSIVE DATES OF POSSESSION	· · · · · · · · · · · · · · · · · · ·	
ORGANIZATION NAME		
		DATE RECEIVED
INCLUSIVE DATES OF POSSESSION		

	Fie	old Sample No. 17, 60, 66
Company Sampled Address TINKE	R AFB OKLAHOMA	•
Sample Point Description MONITER	Weus 7F.60 GG	
Streem Characteristics:		A .
Temperature	Flow/A	pH _ <i>N/A</i>
Visual Observations/Comments		
Callestor's Name NANCY STE	Date/Time Sampled	1/6/84 7/0/84
Amount of Sample Collected		11-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1
Sample Description WELL WATER		
Store at: Ambient A5°C -	10°C 🗆 Other	
1		
1 -	☐ Return unused portion of sample	Discard unused portions
Other Instructions - Special Handling -	Hazarde NONE	
☐ Hazardous sample (see below)	us sample (see below) A Non-hazardous sample	
☐ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
Li Acidic	☐ Biological	☐ Carcinogenic - suspect
□ Caustic ·	☐ Peroxide	☐ Radioactive
□ Other		
Sample Allocation/Chein of Possessio	in:	
Organization Name		1.100
Parajural School 1810 Mg	Date Received	178/89 Time 0835
Transported By Strange Dy	ORPO-ALab Sample No. 840-	1093
Comments	<u> </u>	
Inclusive Dates of Possession		
Organization Name		
Received By	Date Received	Time
Transported By	Lab Sample No	
Comments		
Inclusive Dates of Possession		
Received By	Date Received	Time
	Lab Sample No	
Comments		
Inclusive Dates of Possession		



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_		Field Sample No. 6A, BC, 7 1
Company Sampled/Address TINK Sample Point Description Well S	er Afb	
Sample Point Description Well 5	amples	
Stream Characteristics: Temperature Visual Observations/Comments	Flow N/A	pH _ <i>UY</i>
Collector's Name NANCY 57 Amount of Sample Collected 2 VOR Sample Description EPA 624/ Store at: Ambient \$35°C -	Date/Time Samples 1 9 1 1/100 PC SITE 10°C □ Other	1/17/84 - 7/18/34
Caution - No more sample available Other Instructions - Special Handling -	☐ Return unused portion of sample	☐ Discard unused portions
☐ Hazardous sample (see below)	⊘ Non-hazan	ious sample
□ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	☐ Lachrymator	☐ Shock sensitive
LJ Acidic	☐ Biological	☐ Carcinogenic · suspect
☐ Caustic	☐ Peroxide	□ Radioactive
□ Other		
Sample Allocation/Chain of Possessico Organization Name Received By Transported By Comments Alca Musical Inclusive Dates of Possession	Date Received Lab Semple No. 84 MAPLE: (A.B.C. + 1	7/20/84 Time 8:35 27/31 1-G
Organization Name		
Received By	Date Received	Time
Transported By	Lab Sample No	
Comments		
Inclusive Dates of Possession		
Organization Name	— · —	
Received By		-
Transported By	•	
Comments		
Inclusive Dates of Possession		



_		Field Sample No LeD. LeE, Lo F
Company Sampled / Address	Lea AFB	66, 7A,7C
Sample Point Description	Lamples	
Stream Characteristics: Temperature	,	pH <i>\u01/A</i>
Collector's Name	ter Other	Sample
Caution - No more sample available	Return unused portion of sam	pie Discard unused portions
Other Instructions · Special Handling ·	Hazards	
☐ Hazardous sample (see below)	Non-ha:	zardous sample
□ Toxic	☐ Skin irritant	☐ Flammable (FP< 40°C)
☐ Pyrophoric	□ Lachrymator	☐ Shock sensitive
□ Acidic	☐ Biological	□ Carcinogenic · suspect
□ Caustic	□ Peroxide	□ Radioactive
Other		
Sample Allocation/Chain of Possession Organization Name <u>Radian</u>	in: erporation	nd <u>8/1/84</u> Time <u>4:00 #</u> 4-08-013
Received By	Date Receive	ed <u>8/1/84</u> Time <u>9:00 tm</u>
	Lab Sample No	4-08-013
CommentsInclusive Dates of Possession		
Organization Name		
Density of Dr.	Date Receive	ed Time
Transported By Federal Cop	Lab Sample No	Pd Time
Comments		
Inclusive Dates of Possession		
Organization Name		
Received By	Date Receive	od Time
Transported By	Lab Sample No	
Comments		
Inclusive Dates of Possession		

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APPENDIX H Analytical Data

All samples for chemical Services' laboratory. reported out, in "batch cal data reports for the key for assigning the services of the services' laboratory. All samples for chemical analysis were submitted to Radian Analytical Services' laboratory. The samples were logged in, and the data reported out, in "batches". The following pages contain the analytical data reports for the various batches of samples. Table H-1 is a key for assigning the samples to the proper batch. Table H-2 is a cross-reference between zones and corresponding laboratory sample batches.



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TABLE H-1. LABORATORY BATCH BREAKOUT KEY

- Lab # 84-06-166, June 20, 1984 Sediment Samples TSED-01, 02, 03, 04, 05, 06
- Lab # 84-06-190, June 21, 1984 Sediment Samples TSED-07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 18
- Lab # 84-06-206, June 22, 1984 Sediment Samples TSED-19, 21, 22, 24, 25, 26, 27
- Lab # 84-07-090, July 18, 1984 6D, 6G, 7F for EPA Method 601
- Lab # 84-07-093, July 18, 1984 6D, 6G, 7F for EPA Method 624/625
- Lab # 84-07-112, July 20, 1984 6A, 6B, 6C, 7G for EPA Method 601
- Lab # 84-07-113, July 20, 1984 Sediment Samples TSED-20, 23, 28
- Lab # 84-07-131, July 23, 1984 6A, 6B, 6C, 7G for EPA Method 624/625
- Lab # 84-08-003, August 1, 1984 2A, 6C, 6D, 6E, 6F, 6G, 7A, 7C, 7F for EPA Method 601
- Lab # 84-08-013, August 1, 1984
 6D, 6E, 6F, 6G, 7A, 7C, for EPA Method 624/625
- Lab # 84-08-020, August 2, 1984 6A, 6B, 6D, 6G, 7G for EPA Method 601
- Lab # 84-08-167, August 16, 1984 6E, 6F, 7A, 7C (Sample on 8/14), 7C (Sample on 8/15) for EPA Method 601

TABLE H-2. CROSS REFERENCE

SE

	Sampling (Figure 3	Station -4)	Lab #	84-		
Sediments - TSED-0			06-: 06-:			
0:			06-			
0			06-			
0		(duplicate)	06-			
0	6 20	-	06-			
0	7 12		06-	190		
0:	8 13		06-	190		
0	9 22		06-	190		
10			06-	190		
1			06-	190		
1:			06-	190		
1:			06-			
1	4 16		06-	190		
1.			06-	190		
10			06-			
1			06-3	190		
1:		(duplicate)	06-			
1			06-	206		
2			07-	113		
2			06-	206		
2.		(duplicate)	06-			
2			07-			
2			06-			
2			06-			
2			06-			
2			06-			
2	8 24		07-	113		
Monitor Wells - 2	A		08-	003		
6.			07-131,			
6			07-131,			
6			07-131,			
6		07-090,	07-093,	08-003,	08-013,	08-020
6			08-013,			
6			08-013,			
6	G	07-090,	07-093,	08-003,	08-013,	U8 - 020
7.			08-013,			
7			08-013,			
7:			07-093,			
7	G	07-112,	07-131,	08-020		

^{*}Incorrect sample site; sample discarded.

Special Digestion Method Special Digestion Method specific matrix was not within acceptable limits indicating * Indicates a value less than 5 times the detection limit. CONTACT CONDVER Total Organic Carbon @ Indicates that spike recovery for this analysis on the RCRA Herbicides and RCRA Pesticides results are reported Selenium, low level CERTIFIED BY Total Phenolics Potential error for such low values ranges between Analytical Serv TEST CODES and NAMES used on this report PCBs in Soil Zinc, ICPES PREP W PHEN A PREPARED Radian Analytical Services PREP X Footnotes and Comments SE GA ZN E PHA 5 Duplicate of report of 08/15/84 Austin, Texas 78766 8501 MoPac Blvd (512) 454-4797 P. O. Box 9948 an interferent present. Serv REPORT 04/26/85 12:15:10 Mercurg, Cold Vapor Arsenic, low level Manganese, ICPES Chromium, ICPES RCRA Pesticides RCRA Herbicides ead, low level Cadmium, ICPES Total Cuanide Barium, ICPES Copper, ICPES Nickel, ICPES Fluoride, IC Silver, ICPES Nitrate, IC 50 and 100% PHONE B≺ ATTEN in ua/a HIRCRA PIRCRA CNTOTA HG CA NO3 IC PB GA AG E CR E Z M BA E CDE CUE SAMPLES SAMPLE IDENTIFICATION ATTEN William Little 212-027-21-05 Tinker AFB RECEIVED: 06/20/84 WORK ID sediments Goncarz Austin REPORT Radian TINKER Fed Ex SED-02 rsed-03 ISED-04 SED-05 TSED-06 TSED-01 CL I ENT COMPANY TRANS TAKEN TYPE FACILITY N N 의임임성임성 H-5

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Analytical Serv

LAB # 84-06-166

PAGE 2 RECEIVED: 06/20/

	Analytical Serv		RE-UK-	LAB # 84-06-166
0/84		RESULTS BY TEST	IEST	

TEST CODE	Sample 01	Sample 02 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
AG E		4.7	ij	O ^d	S
i ug/ml	6/60 :	5/50	5/50	6/60	6/67
- AS_GA	0.33	0.41	 O	98 0 0	0. 52
; ug/m]	5/50	5/60	6/60	6/60	5/50
## E	<u></u>	240	530	45	450
t ug/ml	6/60 ;	5/60	6/60	5/5n	5/50
CO_E	- 020 - 020	4 V		ru rui	<. 063 <. 063
: ug/m1	6/60	6/6n	5/6n	5/5n	6/60
CNIDIA	る シ	5	5		3
: mg/L	5/60	5/60	6/6n	6/60	5/50 0
ر چ د	, and	C)	750	3	2
[8/65 H	6/60	6/6n	5/5n	6/6n	6/60 1
بر ا		~	# "U	o	<u>بر</u>
[8/6n	5/6n C	6/6n C	5/50 C	5/5a	6/63 6/63
	n j	, 55 55	ر در در	ر. ورج	⊋ ``
: mg/L	5/6a	5/5n	5/5n	5/60 6/60 6/60	6/6n 6/6n
5.2	ر دور دور	i do i	C C	3000	C. C.S.
1	6/6n	6/6n 000	9/80 07C	9/60 618	6/60
	200	750	<u>بر</u>	21+	ספס
[42/@]	9/60	6/6n 6/6n	5/50 3 U	6/60	8/6a
ב. ב ווי	····	×	r> >~`	C	J.
. cg/@l	5/5n	6/60	6/6n	6/60	6/60
	⇔ —	.	ن نر.	. ;	• •
: mg/L	6/6n	5/6n	5/5n	6/60	6/60
TD 02	2	9 0 9	73		73
: cg/ml : DfR CC	6/5n	6 / 6 n	5/50 CN	6/6n UN	5/62 CN
6/6n	<u></u>		Ē	2	2
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RECEIVED: 06/20/84		RESULTS BY TEST	TEST	CONTINUED FROM ABOVE	OM ABOVE
PHEN A mg / L PH A	(, 01 7, 10	0.18 6.90	0.11 7.10	0.05 .9 ⁹ 9 6.75	0.02
c 1	06/22/84	06/22/84	06/22/84	06/22/84	06/22/84
1	09/27/84	06/27/84	06/27/84	06/27/84	06/27/84
SE GA	0.55	0.61	0.39	0.48	0.53
100 m1 11 11 11 11 11 11 11 11 11 11 11 11	0,52	6/65 00000	0, 63	ug/g 1.03	8/67 0
NE NE	6/60	9 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	6/85C	6/67 50 70 70 70	9 C.
19/m1 :	6/6n	5/57	6/60	6/6n	5/6n
TEST CODE	Sample 06 (entered units)				
AG_E	C				
45 GA	0,49				
DA E	520				
CO/m1	6/62 (
Control Contro	6/65				
GR_E	5100				
lm/6u	6,460				

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LAB # 84-06-166 CONTINUED FROM ABOVE		•	
Analytical Serv REPORT RESULTS BY TEST	23 0. 62 0. 049 0. 049 710 47 47 2. 14	100 Ug/g ND 0, 09 8, 53 8, 53	5/27/84 0.61 2.28 2.28 9.9.9
76/20/84			
PAGE 4 RECEIVED: 06/20/84	CO TENT TENT TENT TENT TENT TENT TENT TEN	PP	PREP Company of the C

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771-308-08-0	LAB # 04-00-100	NAME RCRA Herbicides Category	VERIFIED BY LLN	ULT DET. LIMIT			·	NAME RCRA Pesticides Category	VERIFIED BY <u>LLN</u>	ULT DET. LIMIT				
	5	FRACTION O1B TEST CODE HIRCRA NAME RODate & Time Collected 06/19/84	DATE INJECTED <u>07/23/84</u> ANALYST <u>DRL</u>	OTHER HERBICIDES RESULT			EFINITIONS FOR THIS REPORT. specified detection limit. icrograms/liter unless otherwise specified.	FRACTION O1B TEST CODE PIRCRA NAME RU Date & Time Collected 06/19/84	DATE INJECTED 07/06/84 ANALYST DRL	OTHER PESTICIDES RESULT				
	Analytical Serv Results by Sample	FRACTION O1B Date & Time Col		ALT DET. LIMIT	2.2	<u> </u>	AND D the in m	FRACTION O1B Date & Time Col		ALT DET. LIMIT	302	202	₹ 05	. 02
CONTORATION	PAGE 3 RECEIVED: 06/20/84	SAMPLE ID TSED-01	DATE EXTRACTED <u>07/17/84</u> CONCENTRATION FACTOR	COMPOUND RESULT	2, 4-0	2,4,5-TP (Silver)	NOTES (NOTES AND IN THE NOTES AT A STATE AND A STATE A	SAMPLE ID TSED-01	DATE EXTRACTED <u>06/29/84</u> CONCENTRATION FACTOR	COMPOUND RESULT	Lindane <. 002	Endrin < 002	Methoxychlor	Toxaphene

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NOTES AND DEFINITIONS FOR THIS REPORT.

PAGE 6 RECEIVED: 06/20/84	Anal	Analytical Serv Results by Sample	REPURT Sample	LAB # 84-06-166 Continued From Above
SAMPLE ID ISED-01		FRACTION O1B Date & Time Co	ION OIB TEST CODE PIRCRA & Time Collected 06/19/84	NAME RCRA Pesticides Category
ND = not dete All results r	detected at the ts reported in	specified micrograms/	tion limit. unless otherwise	specified
SAMPLE ID ISED-02		FRACTION O2B Date & Time Co	ION O2B TEST CODE HIRCRA & Time Collected 06/19/84	NAME RCRA Herbicides Category
DATE EXTRACTED <u>07/</u> CONCENTRATION FACTOR	07/17/84	DATE	DATE INJECTED 07/23/84 ANALYST DRL	VERIFIED BY LLN
COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT BET. LIMIT
2, 4-6	\ \ 			
2,4,5-TP (Silvex)	(V)			
ND = not dete All results r	NOTES AND Edetected at the ts reported in m	DEFINITIONS FOR specified detecmicrograms/liter	REPORT. limit. ess otherwise	specified.
SAMPLE ID ISED-02		FRACTION <u>O2B</u> Date & Time Co	TON O2B TEST CODE PIRCRA & Time Collected 06/19/84	NAME RCRA Pesticides Category
DATE EXTRACTED <u>06/</u> CONCENTRATION FACTOR	06/29/84	DATE	INJECTED 07/06/84 ANALYST DRL	VERIFIED BY LLN
COMPOUND	RESULT	DET. LIMIT	OTHER PESTICIDES	RESULT BET. LIMIT
Lindane	<.002			
Endrin	005			
Methoxychlor	<.02			G-T-e
			多位 · 安徽 · 安徽	

LAB # 84-06-166 Continued From Above VERIFIED BY LLN VERIFIED BY LLN DET. MIMIT NAME RCRA Pesticides NAME RCRA Herbicides NAME RCRA Pesticides Category Category Category RESULT All results reported in micrograms/liter unless otherwise specified. All results reported in micrograms/liter unless otherwise specified FRACTION 03B TEST CODE PIRCRA Date & Time Collected 06/19/84 FRACTION 02B TEST CODE PIRCRA Date & Time Collected 06/19/84 FRACTION 03B TEST CODE HIRCRA Date & Time Collected 06/19/84 OTHER HERBICIDES DATE INJECTED 07/06/84 ANALYST DRL DATE INJECTED 07/23/84 ANALYST DRL NOTES AND DEFINITIONS FOR THIS REPORT. NOTES AND DEFINITIONS FOR THIS REPORT ND = not detected at the specified detection limit. ND = not detected at the specified detection limit. REPORT Analytical Serv Results by Sample DET. LIMIT × 5 \ \ \ \ <. 02 RESULT # DATE EXTRACTED 07/17/84 DATE EXTRACTED 06/29/84 CONCENTRATION FACTOR TO THE PROPERTY OF THE PROPERT COMPOUND 2, 4-B Toxaphene 2, 4, 5-TP (Silvex) PAGE 7 RECEIVED: 06/20/84 SAMPLE 1D ISED-02 SAMPLE ID TSED-03 SAMPLE 10 TSED-03

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PAGE 8	Analut	utical Serv	REPORT	LAB # 84-06-166
RECEIVED: 06/20/84		Results by Sample	Sample	Continued From Above
SAMPLE ID TSED-03		FRACTION 03B Date & Time Co.	TEST CODE PIRCRA	FRACTION 03B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected 06/19/84 Category
COMPOUND	RESULT	DET. LIMIT	OTHER PESTICIDES	RESULT DET. LIMIT
Lindane	<. 002 <. 002			
Endrin	₹. 002			
Methoxychlor	<. 02 <. 02			
Toxaphene	₹.02			
	00400	TOCODO CALLA DOS SMOITIMATORA	100000	

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NAME RCRA Herbicides Category All results reported in micrograms/liter unless otherwise specified. FRACTION 04B TEST CODE HIRCRA Date & Time Collected 06/19/84 NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit. SAMPLE 1D TSED-04

H-12

VERIFIED BY LLN DET. LIMIT RESULT DATE INJECTED 07/23/84
ANALYST DRL OTHER HERBICIDES DET. LIMIT () () (N) RESULT DATE EXTRACTED 07/17/84 CONCENTRATION FACTOR COMPOUND 2, 4-D 2, 4, 5-TP (Silvex)

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

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PAGE Y RECEIVED: 06/20/84		ytical Serv Results by Sample	KEPUK! Sample	LAK # 84-06-166	
SAMPLE ID TSED-04		FRACTION 04B Date & Time Co	FRACTION 04B TEST CODE PIRCRA Date & Time Collected 06/19/84	NAME RCRA Pesticides Category	j 1
DATE EXTRACTED C CONCENTRATION FACTOR	06/29/84	DATE	INJECTED 07/06/84 ANALYST DRL	VERIFIED BY <u>LLN</u>	
COMPOUND	RESULT	DET. LIMIT	OTHER PESTICIDES	RESULT DET. LIMIT	
Lindane	€. 002				
Endrin	<. 002				
Methoxychlor	<. 02				
Toxaphene	<.02				
H-13					
ND = not de All results	NOTES AND detected at the ts reported in	d i	erwise	specified.	
SAMPLE ID TSED-05		FRACTION 05B Date & Time Co	PRACTION OSB TEST CODE HIRCRA Date & Time Collected O6/19/84	NAME RCRA Herbicides Category	1 1
DATE EXTRACTED G CONCENTRATION FACTOR	07/17/84	DATE	DATE INJECTED 07/23/84 ANALYST DRL	VERIFIED BY LLN	
COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES	RESULT DET. LIMIT	
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NOTES AND DEFINITIONS FOR THIS REPORT.

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2, 4-D

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2, 4, 5-TP (Silvex)

LAB # 84-06-166 Continued From Above VERIFIED BY LLN DET. LIMIT NAME RCRA Pesticides NAME RCRA Herbicides Category Category RESULT All results reported in micrograms/liter unless otherwise specified FRACTION OSB TEST CODE HIRCRA Date & Time Collected 06/19/84 FRACTION OSB TEST CODE PIRCRA Date & Time Collected 06/19/84 OTHER PESTICIDES DATE INJECTED 07/06/84 ANALYST DRL the specified detection limit. Serv REPORT Results by Sample DET. LIMIT Analytical Serv ND = not detected at ₹. 002 ÷ 02 <.02 RESULT <. 002 DATE EXTRACTED 06/29/84 CONCENTRATION FACTOR COMPOUND Endrin Lindane Methoxychlor Toxaphene RECEIVED: 06/20/84 SAMPLE ID TSED-05 SAMPLE 1D TSED-05 PAGE 10 H-14

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

NAME RCRA Herbicides Category FRACTION OGB TEST CODE HIRCRA Date & Time Collected O6/19/84 SAMPLE 1D TSED-06

VERIFIED BY LLN RESULT OTHER HERBICIDES DATE INJECTED 07/23/84 ANALYST DRL DET. LIMIT RESULT DATE EXTRACTED 07/17/84 CONCENTRATION FACTOR COMPOUND נוני 后 L

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VERIFIED BY LLN DET. LIMIT VERIFIED BY LLN DET. LIMIT Continued From Above NAME RCRA Herbicides NAME RCRA Pesticides NAME RCRA Herbicides LAB # 84-06-166 Category Category Category RESULT RESULT All results reported in micrograms/liter unless otherwise specified. ND = not detected at the specified detection limit. All results reported in micrograms/liter unless otherwise specified. FRACTION OGB TEST CODE HIRCRA Date & Time Collected O6/19/84 FRACTION 05B TEST CODE PIRCRA Date & Time Collected 06/19/84 DATE INJECTED 07/23/84 ANALYST DRL OTHER HERBICIDES FRACTION OSB TEST CODE HIRCRA Date & Time Collected 06/19/84 OTHER PESTICIDES DATE INJECTED 07/06/84 ANALYST DRL NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit. REPORT Results by Sample DET. LIMIT DET. LIMIT Analytical Serv RESULT <. 002 ≥ ₹ 005 ∴ 02 . S RESULT DATE EXTRACTED 07/17/84 CONCENTRATION FACTOR DATE EXTRACTED 06/29/84 CONCENTRATION FACTOR COMPOUND Endrin COMPOUND Toxaphene Lindane Methoxychlor RECEIVED: 06/20/84 SAMPLE 1D TSED-06 SAMPLE ID TSED-05 SAMPLE ID TSED-05 H - 14

VERIFIED BY LLN LAB # 84-06-166 Continued From Above DET. LIMIT NAME RCRA Pesticides NAME RCRA Herbicides Category Category RESULT All results reported in micrograms/liter unless otherwise specified FRACTION OGB TEST CODE HIRCRA Date & Time Collected O6/19/84 FRACTION OGB TEST CODE PIRCRA Date & Time Collected O6/19/84 OTHER PESTICIDES DATE INJECTED 07/06/84 ANALYST DRL NOTES AND DEFINITIONS FOR THIS REPORT. REPORT ND = not detected at the specified detection limit. Results by Sample Analytical Serv () () ۲. ان CONCENTRATION FACTOR 2, 4, 5-TP (Silver) RECEIVED: 06/20/84 SAMPLE 10 TSED-06 SAMPLE 1D TSED-06 PAGE 11

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All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. = not detected at the specified detection limit.

DET. LIMIT

RESULT

COMPOUND

H-15

<. 002

Lindane

< .002

Endrin

∴ 02

Methoxychlor

. o2

Toxaphene

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LAB # 84-06-190

RECEIVED: 06/21/84

CONTACT CONDVER ERTIFIED BY PREPARED Radian Analutical Services Austin, Texas 78766 8501 MoPac Blvd (512) 454-4797 P. O. Box 9948 ATTEN æ SAMPLES 12 ATTEN William Little Tinker AFB REPORT Radian TO B1. 4 Austin TINKER CLIENT COMPANY FACILITY

PIRCRA and RIRCRA are reported in ug/g

Duplicate of report of 08/16/84. sediments WORK ID

* Indicates a value less than 5 times the detection limit. low values ranges between Potential error for such 50 and 100%.

Footnotes and Comments

specific matrix was not within acceptable limits indicating @ Indicates that spike recovery for this analysis on the an interferent present

> SAMPLE IDENTIFICATION SED-16 **ISED-18** SED-08 60-03S ISED-07 SED-10 SED-12 SED-13 SED-14 SED-15 SED-11 TSED-17

on this report	Total Phenolics	Ha	Special Digesti	Special Digest	Selenium, low	Total Organic C	Zinc, ICPES										
MES used	PHEN A	PH A	PREP W	PREP X	SE GA	T0C	ZN E	ı	ı		1	!	1	ı	1	1	
Analytical Serv TEST CODES and NAMES used										por							
v TEST CO	ICPES	Arsenic, low level	ICPES	, ICPES	yanide	Chromium, ICPES	ICPES	e, IC	RCRA Herbicides	Mercuru, Cold Vapor	Manganese, ICPES	ICPES) IC	RCRA Pesticides	Lead, low level	Soil	
ical Ser	Silver, ICPES	Arsenic	Barium, ICPES	Cadmium, ICPES			Copper, ICPES	Fluoride, IC	-	Mercuru	Mangane	Nickel, ICPES	_			PCBs in Soil	
Analut	AG E	AS GA	BA E	CD E	CNTOTA	CR E	CC E	FIC	HIRCRA	HG CA	E E	N	DI CON	PIRCRA	PB GA	PCB SS	

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tal Organic Carbon lenium, low level

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PAGE 2
RECEIVED: 06/21/84

Analytical Serv REPORT RESULTS BY TEST

LAB # 84-06-190

TEST CODE	Sample OI	Sample O2 (entered units)	Sample 03 (entered units)	Sample 04 (entered units)	Sample 05 (entered units)
AG E		C	G	Ö	 Cy
i ug/ml	6/67	5/50	5/6n	5/60	\$ 5/50
AS_GA	o~ i	 rd	urs crai	. o	0, 66
1 29/m1	2 Cg/g	6/67 908	9/6/	6/6n (PC)	5 6/5n
	200	201	0/03	מ/ממ	- 0/0n
9	77 	0.36	n 	0,54	9
i ug/ml	6/60 3	6/6n	6/6n	0.00 y	: 6/67
		In ;	10.7	10 ·	10.7
ш 502		True	, (L.)		1300
. ug/m1	6/60	5/50	5/50	5/50	3 5/50
3 3	 icri	ਰ ਚਾਂ	2	S	
m/65	6/60	5/5a	5/5n	6/60	5 5/60
- 4;	સું ૦	्र •	ਨ ਂ	ਤ ਤੱ	ر ا ا ا ا
	0.038	0.048	6 / 65 0 10	0, 33 9, 83 9, 83	6/67 0 32 0
: 0g/m1	6,60	6/60	6/60	5/50	6/60
س چ	1000	940	4700	180	790
: cg/al	6/6n C	6/6n 9 U	6/60	5/5n	: 6/6n
1 1 E	7 · · ·	# '.	77	3	
I NO3 IC		5 -0 -0			* • • • • • • • • • • • • • • • • • • •
: mg/L DD 2A	6/60 1	6/67	6/60 88	6/6n	1 6/60
	() ()	> · · · · · · · · · · · · · · · · · · ·	* :	5°	
SS BOA	(10.	<10.	<10.	<10.	<10.
5 S S S S S S S S S S S S S S S S S S S	-				-

190 M ABOUE	URI MBUVE	0.04	06/25/84	06/27/84	0.28	6/65 0.07	5/6/2 6/6/2	6/60	Sample 10	y	0.62	220	5/57	6.011	3000	6/60
LAB # 84-06-190	CUNITINGED FR	0.11	06/25/84	06/27/84	0.32		6/60	6/60	Sample 09	8.6	0,28	330	3000	49.79	140	6/60
REPORT	ובאו	0.08	06/25/84	06/27/84	œ i	0.54	29 / g / g	6/60	Sample 08	C	0.54	320	0.70	ug/g ₹ 01	6/60	6/60
ical Serv	תבשערום פו	0.10	06/25/84	06/27/84	1.0	0.59	5/67	5/50	Sample 07	O)	1.6	220	1.3	6,01	190	6/6n
Analytica		0.13	06/25/84	06/27/84	0.93	0.41 0.41	6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	6/60	Sample 06 (entered units)	3	0, 31	410	12,9	09/9 € 01	130	6/60
PAGE 3					SEGA SEGA		i mg/L		TEST CODE	AG_E	9./m1	UDA E	CD E	CNTOTA		[m/6n

AGE 4	Analytica	I Serv	KEPUK!	CAB # 84-06-170	
:CEIVED: 06/21/84		RESULIS BY	ESI	CUNI INUELI FRUM ABUVE	JA ABUVE
CU E	160	230	တ	52	69
19/m]	6/60		5/50		5/60
<u>ء</u>	0.33 		0.37		O. 33
19/L	6/60		6/60		5/60
G CA	0.10		0.034		0.14
g/m1	6/60		5/5n		į
اسا ح	990 990		230		170
9/m]	6/60		6/ชิก		5/6n
٠.	 E		₩ † •Ø		2
9/m1	6/6n		6/6n		6/60
31 <u>.</u> 83	·•••••••••••••••••••••••••••••••••••••		۰۰ نرن		• <i>i</i>
7/6/	6/6n		6/6n		5/50
₹5	2				C.
g/m]	6/60		6/5n		5/60
CB SS	2				2 2 3
LIN A	000		-		41.0
			77.7		- 1 · >
/ ⊲			51 51 (47) 52 (74) 1744		7
H units					:
REP W	06/25/84	06/25/84	06/25/84	06/25/84	06/25/84
ate_complete					
PRED	06/27/84	06/27/84	06/27/84	06/27/84	06/27/84
E GA	O E	0.93	0	0 23	0.32
g/m1	6/60	6/60	6/60	6/60	5/60
<u></u>	0.43	뜻	0.33	6 8	1. 68
7/6/	6/65	5/65	5/50	6/60	6/65
بر ح	œ	252	o c	190	3
g/ml	6/6n	6/67	6/60	6/60	6/60

	Analytical Serv REPORT RESULTS BY TEST
CORPORATION	PAGE 5 RECEIVED: 06/21/84

LAB # 84-06-190

Sample 11 (entered units)	S	9,60	U. U	200	. 6/60		6/6n	120	6/6n	6/60	0.31	6/67 73	כי כול כי	250	6/67		5/6n	16	6/60	.10.
TEST CODE Sa	AG_E		T5 7	~~ ₩	160/81	 CNIDIA	1/5m;	ا سا ا		-21	_	. mg/L ! HC F∆	1 E/60 :	 	. 09/al	NOW IC	7/6w :	- PB_GA	[E/65	SS 82 67 67 67 67 67 67 67 67 67 67 67 67 67

CORPORATION	:		
PAGE 6 RECEIVED: 06/21/84	Analytical S	Analytical Serv REPORT RESULTS BY TEST	LAB # 84-06-190 CONTINUED FROM ABOVE
PHEN A	0.10		
1 mg/L	6/6n		
oH units) · · ·		
PREP	06/25/84		
i date complete	06/27/84		
date complete	Č		
35	0.31		
: ug/m1	6/65 0 65		
1/6w ;	6/60		
; ng/m]	6/6n		

DET. LIMIT VERIFIED BY MSF VERIFIED BY MSE FRACTION 01B TEST CODE HIRCRA NAME RCRA Herbicides FRACTION 01B TEST CODE PIRCRA NAME RCRA Pesticides LAB # 84-06-190 Category Category RESULT All results reported in micrograms/liter unless otherwise specified. Date & Time Collected not specified Date & Time Collected not specified DATE INJECTED 07/16/84 ANALYST DRL OTHER HERBICIDES DATE INJECTED 06/29/84 ANALYST DRL NOTES AND DEFINITIONS FOR THIS REPORT. REPORT ND = not detected at the specified detection limit. Results by Sample DET. LIMIT Analytical Serv \ \ Ω ∀ RESULT CONCENTRATION FACTOR DATE EXTRACTED 06/25/84 CONCENTRATION FACTOR COMPOUND 2, 4-B 2, 4, 5-TP (Silver) PAGE 7 RECEIVED: 06/21/84 SAMPLE ID TSED-07 SAMPLE 10 15ED-07

NOTES AND DEFINITIONS FOR THIS REPORT.

DET. LIMIT

RESULT

OTHER PESTICIDES

LIMIT

DET.

RESULT

COMPOUND

€. 002

Endrin

€ 005

Lindane

∴ 02

Toxaphene

. 020 ∴

Methoxychlor

Continued From Above VERIFIED BY MSE VERIFIED BY MSF DET. LIMIT DET. LIMIT NAME RCRA Pesticides ed Category FRACTION 02B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category TEST CODE HIRCRA NAME RCRA Herbicides LAB # 84-06-190 Category RESULT RESULT All results reported in micrograms/liter unless otherwise specified. All results reported in micrograms/liter unless otherwise specified Date & Time Collected not specified FRACTION OIB TEST CODE PIRCRA N Date & Time Collected not specified DATE INJECTED 06/29/84
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LAB # 84-06-190 Continued From Above VERIFIED BY MSF DET. LIMIT VERIFIED BY MSF FRACTION 03B TEST CODE HIRCRA NAME RCRA Herbicides
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REPORT

Analytical Serv

LAB # 84-06-190 Continued From Above DET. LIMIT NAME RCRA Pesticides Category RESULT FRACTION 03B TEST CODE PIRCRA NA Date & Time Collected not specified OTHER PESTICIDES Results by Sample DET. LIMIT <. 002 <. 02 ∴ 02 RESULT <. 002 COMPOUND Endrin Lindane Methoxychlor Toxaphene RECEIVED: 06/21/84 SAMPLE 1D TSED-09

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REPORT

Analytical Serv

All results reported in micrograms/liter unless otherwise specified NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

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VERIFIED BY MSF DET. LIMIT FRACTION 04B TEST CODE HIRCRA NAME RCRA Herbicides Category RESULT Date & Time Collected not specified DATE INJECTED 07/16/84
ANALYST DRL CONCENTRATION FACTOR SAMPLE 1D TSED-10

OTHER HERBICIDES DET. LIMIT \ \ \ \ \ \ RESULT COMPOUND 2, 4-D 2, 4, 5-TP (Silver)

All results reported in micrograms/liter unless otherwise specified NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

VERIFIED BY MSF DET. LIMIT FRACTION 04B TEST CODE PIRCRA NAME RCRA Pesticides
Date & Time Collected not specified Category LAB # 84-06-190 RESULT OTHER PESTICIDES DATE INJECTED 06/29/84 ANALYST DRL REPORT Results by Sample DET. LIMIT Analytical Serv < 005 RESULT ∴ 02 ∴ 02 <. 002 DATE EXTRACTED 06/25/84 CONCENTRATION FACTOR COMPOUND Endrin Lindane Methoxychlor Toxaphene RECEIVED: 06/21/84 SAMPLE 1D TSED-10 PAGE 11

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

FRACTION OSB TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified Category Category SAMPLE ID TSED-11

DET. LIMIT VERIFIED BY MSE RESULT OTHER HERBICIDES DATE INJECTED 07/16/84 ANALYST DRL DET. LIMIT \. () () RESULT DATE EXTRACTED 07/09/84 CONCENTRATION FACTOR COMPOUND 2, 4--D 2, 4, 5-TP (Silvex)

NOTES AND DEFINITIONS FOR THIS REPORT.

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Date & Time Collected not specified FRACTION 06B TEST CODE HIRCRA NAME RCRA Herbicides
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Category LAB # 84-06-190 RESULT RESULT All results reported in micrograms/liter unless otherwise specified. All results reported in micrograms/liter unless otherwise specified OTHER HERBICIDES OTHER PESTICIDES DATE INJECTED 07/16/84
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LAB # 84-06-190 Continued From Above VERIFIED BY MSF DET. LIMIT NAME RCRA Pesticides NAME RCRA Herbicides Category Category RESULT All results reported in micrograms/liter unless otherwise specified FRACTION O6B TEST CODE HIRCRA No Date & Time Collected not specified FRACTION O6B TEST CODE PIRCRA N Date & Time Collected not specified DATE INJECTED <u>06/29/84</u> ANALYST <u>DRL</u> OTHER PESTICIDES NOTES AND DEFINITIONS FOR THIS REPORT. Serv REPORT ND = not detected at the specified detection limit. DET. LIMIT \ \ \ ₹. 002 <. 002 .. 02 €. 02 RESULT DATE EXTRACTED 06/25/84 CONCENTRATION FACTOR COMPOUND 2, 4, 5-TP (Silvex) Endrin Lindane Methoxychlor Toxaphene RECEIVED: 06/21/84 SAMPLE 10 ISED-12 SAMPLE 10 TSED-12 H-29

Analytical Serv

All results reported in micrograms/liter unless otherwise specified NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

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Date & Time Collected not specified Category FRACTION O7B TEST CODE PIRCRA NAME RCRA Pesticides
Date & Time Collected not specified Category Category RESULT RESULT All results reported in micrograms/liter unless otherwise specified. DATE INJECTED 06/29/84
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Serv REPORT Results by Sample

Analytical Serv

RECEIVED: 06/21/84

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LAB # 84-06-190

NOTES AND DEFINITIONS FOR THIS REPORT.

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Date & Time Collected not specified Category FRACTION OBB TEST CODE PIRCRA NAME RCRA Pesticides
Date & Time Collected not specified Category Category RESULT RESULT All results reported in micrograms/liter unless otherwise specified. All results reported in micrograms/liter unless otherwise specified. OTHER PESTICIDES DATE INJECTED 07/16/84 ANALYST DRL OTHER HERBICIDES DATE INJECTED 06/29/84 ANALYST DRL NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit. ND = not detected at the specified detection limit. Results by Sample DET. LIMIT DET. LIMIT Ÿ ÷ 02 \ \ \ \ RESULT < 005 ∴ 002
 RESULT CONCENTRATION FACTOR DATE EXTRACTED 06/25/84 CONCENTRATION FACTOR COMPOUND 2, 4-D COMPOUND 2, 4, 5-TP (Silvex) Endrin Lindane Methoxychlor RECEIVED: 06/21/84 SAMPLE 1D TSED-13 SAMPLE 1D TSED-14 SAMPLE ID TSED-14 H-31

LAB # 84-06-190

REPORT

Analytical Serv

PAGE 15

LAB # 84-06-190 Continued From Above VERIFIED BY MSE DET. LIMIT VERIFIED BY MSF FRACTION OBB TEST CODE PIRCRA NAME RCRA Pesticides
Date & Time Collected not specified Category FRACTION 09B TEST CODE HIRCRA NAME RCRA Herbicides FRACTION 09B TEST CODE PIRCRA NAME RCRA Pesticides Category Category RESULT All results reported in micrograms/liter unless otherwise specified. All results reported in micrograms/liter unless otherwise specified. Date & Time Collected not specified Date & Time Collected not specified DATE INJECTED 06/29/84 ANALYST DRL DATE INJECTED 07/16/84
ANALYST DRL OTHER HERBICIDES NOTES AND DEFINITIONS FOR THIS REPORT. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit. ND = not detected at the specified detection limit. Serv Results by Sample DET. LIMIT . 00 03 ۲. ان \ 2 RESULT CONCENTRATION FACTOR DATE EXTRACTED 06/25/84 CONCENTRATION FACTOR COMPOUND Toxaphene 2, 4-D 2, 4, 5-TP (Silvex) RECEIVED: 06/21/84 SAMPLE 10 TSED-14 SAMPLE ID TSED-15 SAMPLE 10 TSED-15 H-32

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Analytical Serv

RECEIVED: 06/21/84		Results by Sample	Sample	Contin	Continued From Above
SAMPLE ID TSED-15		FRACTION 09B Date & Time Co	FRACTION 09B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category	NAME RCRA	Pesticides Category
COMPOUND	RESULT	DET. LIMIT	OTHER PESTICIDES	RESULT	DET. LIMIT
Lindane	<. 002				
Endrin	<. 002				
Methoxychlor	<02				
Toxaphene	<. 02				

LAB # 84-06-190

Analytical Serv

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit. H-33

ICRA Herbicides Category	VERIFIED BY MSE
FRACTION 10B TEST CODE HIRCRA NAME RCRA Herbicides Date & Time Collected not specified Category	DATE INJECTED 07/16/84 ANALYST DRL
SAMPLE ID TSED-16 Da	DATE EXTRACTED <u>07/09/84</u> CONCENTRATION FACTOR

DET. LIMIT RESULT OTHER HERBICIDES DET. LIMIT () () RESULT COMPOUND 2, 4-D 2, 4, 5-TP (Silvex)

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

(N (V)

FRACTION 10B TEST CODE PIRCRA NAME RCRA Pesticides
Date & Time Collected not specified Category Results by Sample RECEIVED: 06/21/84 SAMPLE 1D TSED-16

LAB # 84-06-190

REPORT

Analytical Serv

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DET. LIMIT VERIFIED BY MSF RESULT DATE INJECTED 06/29/84 ANALYST DRL OTHER PESTICIDES DET. LIMIT < 005 ∴ 005 RESULT DATE EXTRACTED 06/25/84 CONCENTRATION FACTOR COMPOUND Lindane Endrin

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

∴ 02

Methoxychlor

∴ 02

Toxaphene

H - 34

VERIFIED BY MSE NAME RCRA Herbicides Category FRACTION 11B TEST CODE HIRCRA N Date & Time Collected not specified DATE INJECTED 07/16/84
ANALYST DRL DATE EXTRACTED 07/09/84 CONCENTRATION FACTOR SAMPLE 10 TSED-18

RESULT OTHER HERBICIDES DET. LIMIT \ \ \ \ Ş RESULT COMPOUND 2, 4-5 2, 4, 5-TP (Silvex)

DET. LIMIT

NOTES AND DEFINITIONS FOR THIS REPORT.

LAB # 84-06-190 Continued From Above FRACTION 11B TEST CODE HIRCRA NAME RCRA Herbicides Date & Time Collected not specified Category Analytical Serv REPORT Results by Sample SAMPLE 1D TSED-18

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PAGE 19 RECEIVED: 06/21/84

All results reported in micrograms/liter unless otherwise specified the specified detection limit. ND = not detected at

ides	ñ.J.	VERIFIED BY MSE	DET. LIMIT				
TE RCRA Pestic	Category	VERIFIE	RESULT DE				
FRACTION 118 TEST CODE PIRCRA NAME RCRA Pesticides	lected not specified	DATE INJECTED 06/29/84 ANALYST DRL	OTHER PESTICIDES				
FRACTION 118	Date & Time Co	DATE	DET. LIMIT				
		06/25/84	RESULT	<. 002	₹. 002	₹.02	C 02
SAMPLE ID ISED-18		DATE EXTRACTED <u>06/25/84</u> CONCENTRATION FACTOR	COMPOUND	Lindane	Endrin	Methoxychlor	Toxaphene
SAMPLE		CONCE		• !	н-35		

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

PAGE 20 RECEIVED: 06/21/84

Analytical Serv REPORT NonReported Work FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

LOG_IN 12A :

RECEIVED: 06/22/84

REPORT 04/26/85 11: 52: 34 Analytical Serv

LAB # 84-06-206

Services Austin, Texas 78766 PREPARED Radian Analytical 8501 MoPac Blvd (512) 454-4797 Box 9948 ٥ × ATTEN PHONE SAMPLES William Little REPORT Radian Austin TINKER B1. 4 ATTEN CL IENT

ERTIFIED BY

CONTACT CONDVER

RCRA Herbicides and RCRA Pesticides are reported in ug/g

Tinker AFB

COMPANY

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Duplicate of report of OB/15/84

* Indicates a value less than 5 times the detection limit. Potential error for such low values ranges between Footnotes and Comments

50 and 100%.

212-027-21-05

3829

specific matrix was not within acceptable limits indicating @ Indicates that spike recovery for this analysis on the

an interferent present

SAMPLE IDENTIFICATION

1SED-22 1SED-24 TSED-19 TSED-26 ISED-21 TSED-25 TSED-27 의임임회의의의

Analytical Serv TEST CODES and NAMES used on this report PREP W PHEN A SE GA PH TOC Mercury, Cold Vapor Arsenic, low level Barium, ICPES Manganese, ICPES Chromium, ICPES RCRA Pesticides RCRA Herbicides ead, low level Cadmium, ICPES Copper, ICPES Nickel, ICPES otal Cyanide Silver, ICPES Fluoride, IC Nitrate, IC HIRCRA PIRCRA CNTOTA NO3 IC PB GA AS GA HG CA Z E BA E S E FIC W ວູ

PCBs in Soil

PCB SS

Special Digestion Method Special Digestion Method

Total Phenolics

Sotal Organic Carbon Selenium, low level

ICPES

Zincı

H - 37

PAGE 2 RECEIVED: 06/22/84

Analytical Serv REPURT RESULTS BY TEST

LAB # 84-06-206

\$655 P 125022000 Reserved

TEST CODE	Sample 01	Sample 02	Sample 03	Sample 04	Sample 05
default units	(entered units)	(entered units)	(entered units)	(entered units)	(entered units)
AGE	9	9	C	Ç	<u>က</u>
; ug/m1	6/60	6/60	6/60	5/50	5 6/60
: AS GA	0.8	رى نسخ	r~i	സ്	0.64
i ug/ml	6/60 :	5/60	5/50	6/60	: 6/60
표 점 	330	340	370	480	350
: ug/m1	6,60	6/65	5/50	6/6n	; 6/65
 	ი~ ლ	က	دم نسب	rui	~- rú
: ug/wi	6/60 :	5/50	6/60	6/60	; 6/60
: CNTOTA	- B	영	()	명 ~	 80
; mg/L	6/60	6/60	5/5n	6/60	5/60
سا ح		8	~~	150	
i ug/ml	6/60	5/5n	6/6n	6/6n	6/60
س 3	급	C.	yd yd	E	ത്
ug/m1	6/60 ;	5/50	6/60	5/6n	6/60
سا	C3 C3	o S	Ö	ස ර	0.54
: mg/L	6,60	5/60	5/50	6/60	5/65
# CA	0.45	O. 06	ci ci	0.030	0.094
i ug/m1	6/60	6/60	5/50	6/6n	5/60
<u></u>	200	790	1000	720	2
l wg/ml	6,60	6/60	6/60	6/60	5/50
<u>س</u>	**************************************	2	 :: ::	ST	ru
: ug/m1	6/60	5/50	5/50	6/50	5 6/60
31 EON :	oo rui	وسد فردا	0.46	سس نرین	
: mg/L	6/60	6/60	5/50	6/60	5/50
- PB GA	9	40	N	45	
t ug/m1	6/60	6/60	6/60	6/60	6/60
	2	2	2	2	2
6/67	**				•••

JACE 3	Anslutical	ral Carv	PEDUCA	-An # RA-06-	906
RECEIVED: 06/22/84			TEST	CONTINUED FROM ABOVE	OM ABOVE
PHEN A	(, 01 7, 62	7.26	6. 34 6. 34	<.01 7.34	6.39
PNED W conts	06/27/84	06/27/84	06/27/84	06/27/84	06/27/84
1	06/27/84	06/27/84	06/27/84	06/27/84	06/27/84
SEGA	0.67	0.65	0.48	0. 63	0, 71
100,41	0, 81	2 42 L	1 01	0, 44	1.32/4
1 Mg/L	9/80	8, 65 8, 65 8, 65	9/60 E	9/60 6/64	9 6
	6/60	6/60	5/6n	6/60	6/60
LEST CODE 1	Sample 06 (entered units) (Sample 07 entered units)			
AG E	C	Ç			
AS GA	6/6/	6/67		·	
20 (a)	920 320	9/50 9/50 6/50			
CD E	6/60	מי היים מי היים			
CONTOTA	09/9 0.02	2 (S)			
79 K	6/65 6/67	9 E.S.			
ug/m1	5/6n	5/60			

CU E "9,9 "1,1	0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0	
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PHEN A		
••	71 L 6/6n	
PREP W 1 06/27/84	06/27/84	
	06/27/84	
	0.43	
1 m/67 1 10/9/9		
	5/57	

SOUTH BLOCKERS BUILDING SELECTION

VERIFIED BY LLN VERIFIED BY LLN DET. LIMIT DET. LIMIT FRACTION OIB TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified FRACTION OIB TEST CODE PIRCRA NAME RCRA Pesticides
Date & Time Collected not specified Category RESULT RESULT All results reported in micrograms/liter unless otherwise specified DATE INJECTED 07/26/84 ANALYST DRL OTHER HERBICIDES DATE INJECTED 07/02/84 ANALYST DRL OTHER PESTICIDES NOTES AND DEFINITIONS FOR THIS REPORT. Serv REPORT ND = not detected at the specified detection limit. DET. LIMIT DET. LIMIT RESULT **30.2** <0.2 RESUL T < 005 < 005 DATE EXTRACTED 07/13/84 CONCENTRATION FACTOR DATE EXTRACTED 07/01/84 CONCENTRATION FACTOR COMPOUND 2,4-0 COMPOUND Endrin 2, 4, 5-TP (Silver) Lindane SAMPLE ID TSED-19 SAMPLE ID TSED-19

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LAB # 84-06-206

Analytical Serv

RECEIVED: 06/22/84

NOTES AND DEFINITIONS FOR THIS REPORT.

÷ 05

Methoxychlor

€. 02

Toxaphene

PAGE 6	CORPORATION	Analytic		REPORT		LAB # 84-06-206	-06-206
RECEIVED: 06/22/84	06/22/84		Results by Sample	Sample		Continued	continued From Apove
SAMPLE 10 TSED-19	TSED-19		FRACTION OIB TEST CODE PIRCRA N	TEST CODE PIRCRA NAME RCRA Pesticides	IRCRA NAME	RCRA Pes	Pesticides
			the specified detection limit.	ion limit.	מבר זו זכח		b inha
	All results r	reported in	micrograms/liter	unless other:	wise specit	. e d .	
SAMPLE 10 ISED-21	TSED-21		FRACTION 02B TEST CODE HIRCRA N Date & Time Collected not specified	TEST CODE HIRCRA lected not specifie	IRCRA NAME	NAME RCRA Herbicides	Herbicides Category
DAT CONCENTRA	DATE EXTRACTED <u>07/13/84</u> CONCENTRATION FACTOR	13/84	DATE	DATE INJECTED <u>07/3</u> ANALYST <u>DRL</u>	07/26/84 DRL	VERI	VERIFIED BY <u>LLN</u>
	COMPOUND	RESULT	DET. LIMIT	OTHER HERBICIDES		RESULT	BET. LIMIT
	2, 4-D	<0.2					
2, 4, 5-TP	-TP (Silvex)	₹0.5					
H-42	ND = not dete All results r	NOTES AND I detected at the ts reported in m	DEFINITIONS FOR specified detecnic rograms/liter	s FOR THIS REPORT. detection limit. liter unless other	wise specif	i ed.	
SAMPLE ID TSED-21	TSED-21		FRACTION 02B	TEST CODE P	IRCRA NAME	NAME RCRA Pesticides	sticides
			Date & Time Collected not specified	lected not s	pecified	Cat	Category
DAT CONCENTRA	DATE EXTRACTED <u>07/</u> CONCENTRATION FACTOR	07/01/84	DATE	DATE INJECTED <u>07/</u> ANALYST <u>DRL</u>	07/02/84 DRL	VERI	VERIFIED BY LLN
	COMPOUND	RESULT	DET. LIMIT	OTHER PESTICIDES		RESULT	DET. LIMIT
	Lindane	₹ 005					
	Endrin	<.002					
Σ	Methoxychlor	₹ 05					
							3

VERIFIED BY LLN VERIFIED BY LLN LAB # 84-06-206 Continued From Above DET. LIMIT NAME RCRA Pesticides NAME RCRA Pesticides NAME RCRA Herbicides Category Category RESULT All results reported in micrograms/liter unless otherwise specified All results reported in micrograms/liter unless otherwise specified FRACTION 02B TEST CODE FIRCRA NA Date & Time Collected not specified FRACTION 03B TEST CODE PIRCRA N Date & Time Collected not specified FRACTION 03B TEST CODE HIRCRA N Date & Time Collected not specified DATE INJECTED 07/26/84 ANALYST DRL OTHER HERBICIDES DATE INJECTED 07/02/84 ANALYST DRL NOTES AND DEFINITIONS FOR THIS REPORT. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit. ND = not detected at the specified detection limit. Serv Results by Sample DET. LIMIT 0.2 0. 2 . 00 ∴ RESULT DATE EXTRACTED 07/13/84 CONCENTRATION FACTOR CONCENTRATION FACTOR COMPOUND 2, 4-D Toxaphene 2, 4, 5-TP (Silvex) RECEIVED: 06/22/84 SAMPLE 10 TSED-22 SAMPLE 1D TSED-22 SAMPLE ID ISED-21 H-43

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Analytical Serv

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REPORT

Analytical Serv

LAB # 84-06-206 Continued From Above DET. LIMIT NAME RCRA Pesticides Category RESULT FRACTION 03B TEST CODE PIRCRA No Date & Time Collected not specified OTHER PESTICIDES Results by Sample DET. LIMIT <.02 ∴ 02 ₹ 005 <. 00€ RESULT COMPOUND Lindane Endrin Methoxychlor Toxaphene RECEIVED: 06/22/84 SAMPLE ID TSED-22

All results reported in micrograms/liter unless otherwise specified NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

H-44

VERIFIED BY LLN FRACTION 04B TEST CODE HIRCRA NAME RCRA Herbicides Category Date & Time Collected not specified DATE INJECTED 07/26/84 ANALYST DRL DATE EXTRACTED 07/13/84 CONCENTRATION FACTOR SAMPLE 10 TSED-24

DET. LIMIT RESULT OTHER HERBICIDES DET. LIMIT 0.2 0.2 RESULT COMPOUND 2, 4-B 2, 4, 5-TP (Silvex)

All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

VERIFIED BY LLN VERIFIED BY LLN DET. LIMIT FRACTION 04B TEST CODE PIRCRA NAME RCRA Pesticides
Date & Time Collected not specified Category NAME RCRA Herbicides Category RESULT All results reported in micrograms/liter unless otherwise specified. FRACTION OSB TEST CODE HIRCRA N Date & Time Collected not specified DATE INJECTED 07/26/84 ANALYST DRL OTHER PESTICIDES DATE INJECTED 07/02/84
ANALYST DRL NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.DET. LIMIT <.02 <. 002 ∴ 02 RESULT DATE EXTRACTED 07/01/84 CONCENTRATION FACTOR DATE EXTRACTED <u>07/13/84</u> CONCENTRATION FACTOR COMPOUND Endrin Lindane Methoxychlor Toxaphene SAMPLE 1D TSED-24 SAMPLE 1D TSED-25 H-45

LAB # 84-06-206

Serv REPORT Results by Sample

Analytical Serv

RECEIVED: 06/22/84

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NOTES AND DEFINITIONS FOR THIS REPORT.

DET. LIMIT

OTHER HERBICIDES

DET. LIMIT

RESULT

COMPOUND

. 60. 20

2, 4-13

<0.5 2 €

2,4,5-TP (Silver)

LAB # 84-05-206 Continued From Above VERIFIED BY LLN LIMIT VERIFIED BY LLN DET. LIMIT FRACTION 06B TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified FRACTION OSB TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified FRACTION OSB TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category DET Category RESULT RESULT All results reported in micrograms/liter unless otherwise specified. All results reported in micrograms/liter unless otherwise specified. OTHER PESTICIDES DATE INJECTED 07/26/84 ANALYST DRL OTHER HERBICIDES DATE INJECTED 07/03/84 ANALYST DRL NOTES AND DEFINITIONS FOR THIS REPORT. the specified detection limit. ND = not detected at the specified detection limit. Results by Sample LIMIT DET. LIMIT DET. <. 002 ∴ 02 <. 02 ∴ 02 ND = not detected at ₹. 002 RESULT RESULT CONCENTRATION FACTOR DATE EXTRACTED 07/13/84 COMPOUND COMPOUND Endrin Lindane Methoxychlor Toxaphene CONCENTRATION FACTOR RECEIVED: 06/22/84 SAMPLE 10 TSED-25 SAMPLE 10 1SED-25 SAMPLE 10 TSED-26 H-46

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REPORT

Analytical Serv

VERIFIED BY LLN DET. LIMIT FRACTION 06B TEST CODE PIRCRA NAME RCRA Pesticides
Date & Time Collected not specified Category FRACTION 06B TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified RESULT All results reported in micrograms/liter unless otherwise specified. DATE INJECTED 07/03/84 ANALYST DRL OTHER PESTICIDES NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit. DET. LIMIT 0.2 <.002 <.002 0.2 ∴ 02 RESULT DATE EXTRACTED 07/01/84 CONCENTRATION FACTOR 2,4-0 COMPOUND 2, 4, 5-TP (Silvex) Endrin Lindane Methoxychlor SAMPLE 10 TSED-26 SAMPLE 1D TSED-26

Continued From Above

LAB # 84-06-206

REPORT

Analytical Serv

RECEIVED: 06/22/84

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Results by Sample

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All results reported in micrograms/liter unless otherwise specified. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit.

<.02

Toxaphene

VERIFIED BY LLN VERIFIED BY LLN DET. LIMIT DET. LIMIT FRACTION O7B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category FRACTION 07B TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified Category RESULT RESULT All results reported in micrograms/liter unless otherwise specified. DATE INJECTED 07/03/84 ANALYST DRL OTHER PESTICIDES DATE INJECTED 07/26/84 ANALYST DRL OTHER HERBICIDES NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit. DET. LIMIT DET. LIMIT ₹0.5 ₹0.5 005 ∴ 02 ∴ 02 RESULT <. 002 RESULT DATE EXTRACTED 07/13/84 CONCENTRATION FACTOR DATE EXTRACTED 07/01/84 CONCENTRATION FACTOR COMPOUND 2, 4-D COMPOUND Lindane Endrin 2, 4, 5-TP (Silvex) Methoxychlor Toxaphene SAMPLE ID TSED-27 SAMPLE 10 15ED-27

LAB # 84-06-206

REPORT

Analytical Serv

RECEIVED: 06/22/84

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Results by Sample

NOTES AND DEFINITIONS FOR THIS REPORT.

ı serv Results by Sample Analytical Serv PAGE 13 RECEIVED: 06/22/84

SAMPLE ID ISED-27

LAB # 84-06-206 Continued From Above

NAME RCRA Pesticides ed Category

いたからは、アメングとなると、「これをひからな」、これがはないない。「なからなっては、「ないないないない」

ND = not detected at the specified detection limit. All results reported in micrograms/liter unless otherwise specified. FRACTION 07B TEST CODE PIRCRA NA Date & Time Collected not specified

specific matrix was not within acceptable limits indicating * Indicates a value less than 5 times the detection limit. CONTACT CONDVER @ Indicates that spike recovery for this analysis on the second column confirmation performed on all three CERTIFIED BY Potential error for such low values ranges between Analytical Serv TEST CODES and NAMES used on this report PREPARED Radian Analutical Services Footnotes and Comments Duplicate of report of OB/O7/84 Austin, Texas 78766 samples on this work order 8501 MoPac Blvd (512) 454-4797 P. O. Box 9948 an interferent present 50 and 100% ATTEN B≺ Note: SAMPLES SAMPLE IDENTIFICATION ATTEN William Little 212-027-21-05 Tinker AFB REPORT Radian Austin Fed Ex TINKER wells, TRANS 5 COMPANY FACILITY WORK ID CL IENT TAKEN o. NS. 송 의영영 H-51

LAB # 84-07-090

REPORT

Analytical Serv REPO 04/26/85 11:54:42

RECEIVED: 07/18/84

CORPORATION

RECEIVED: 07/18/84

REPORT Analytical Serv

LAB # 84-07-090

Results by Sample

0.6 皇 물 밀 9 물 멸 8 2 일 밀 20.5 RESULT COMPOUNDS DETECTED VERIFIED BY Trichloroethene Bromoform 2-Chloroethylvinyl Ether Chlorobenzene 1, 3-Dichlorobenzene 1, 2-Dichlorobenzene 1, 4-Dichlorobenzens NAME EPA Method 601/60 cis-1, 3-Dichloropropene 1, 1, 2, 2-Tetrachloroethane Dibromochloromethane 1, 1, 2-Trichloroethane Tetrach loroethy lene Category COMPOUND RGS FRACTION OIA TEST CODE GC 601 N Date & Time Collected not specified ANALYST INSTRUMENT SCAN DATE INJECTED 07/24/84 S 윋 2.0 S 皇 2 일 일 밀 g Q. 2 RESULT Chloromethane Vingl Chloride Chloroethane Methylene Chloride Trichlorofluoromethane trans-1, 2-Dichloroethene Chloroform 1, 1, 1-Trichloroethane Bromomethane 1, 1-Dichloroethene 1,1-Bichloroethane 1,2-Bichloroethane Carbon Tetrachloride Bromodichloromethane COMPOUND DATA FILE CONC. FACTOR SAMPLE 10 60 SCAN H-52

呈

trans-1, 3-Dichloropropene

밀

1, 2-Dichloropropane

PAGE 3 RECEIVED: 07/18/84

Analytical Serv RePORT Results by Sample

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LAB # 84-07-090 Continued From Above

SAMPLE ID 6D

FRACTION OIA TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

Category

NOTES AND DEFINITIONS FOR THIS REPORT

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in $\frac{uq/L}{L}$ unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

RECEIVED: 07/18/84

REPORT Results by Sample Analytical Serv

LAB # 84-07-090

SAMPLE 1D 66

NAME EPA Method 601/GC

FRACTION OZA TEST CODE GC 601 NA Date & Time Collected not specified

Category ANALYST INSTRUMENT DATE INJECTED 07/25/84

엉 RESULT 9 皇 윋 月 9 VERIFIED BY COMPOUNDS DETECTED Trichloroethene 2-Chloroethylvinyl Ether Bromoform 1, 4-Dichlorobenzene Chlorobenzene 1, 3-Dichlorobenzene 1, 2-Dichlorobenzene 1, 1, 2-Trichloroethane Dibromochloromethane 1, 1, 2, 2-Tetrachloroethane Tetrach loroethy lene cis-1, 3-Dichloropropene COMPOUND SCAN 2 9 S 9 RESUL T Chloromethane Vinyl Chloride Methylene Chloride Chloroform Bromomethane Chloroethane **Trichlorofluoromethane** 1, 1-Dichloroethane trans-1, 2-Dichloroethene 1, 2-Dichloroethane 1, 1, 1-Trichloroethane Carbon Tetrachloride 1, 1-Dichloroethene COMPOUND DATA FILE CONC. FACTOR SCAN H-54

trans-1,3-Dichloropropene

Bromodichloromethane

1, 2-Dichloropropane

RECEIVED: 07/18/84

Analytical Serv REPORT Results by Sample

LAB # 84-07-090 Continued From Above

Control of the Contro

SAMPLE 1D 66

FRACTION OZA TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute All results reported in <u>ug/L</u> unless otherwise specified. SCAN = scan number or retention time on chromatogram

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Analytical Serv REPORT Results by Sample

LAB # 84-07-090

CONTRACTOR SERVICES SERVICES

SAMPL	SAMPLE ID 7F	FRACT	FRACTION 03A TE Date & Time Collec	FRACTION 03A TEST CODE GC 601 N Date & Time Collected not specified	NAME EPA Method 601/GC led Category
CONC.	DATA FILE	B DATE INJECTED	07/25/84	ANAL YST INSTRUMENT	RGS VERIFIED BY JSG COMPOUNDS DETECTED 10
	SCAN	COMPOUND	RESULT	SCAN	COMPOUND
		Chloromethane	8 59	8	Trichloroethene 0.9
		Bromomethane	Q		Dibromochloromethane * ND
	CU	Vingl Chloride	10.8		1, 1, 2-Trichloroethane * ND
	[0]	Chloroethane	6. 6.		cis-1,3-Dichloropropene * ND
	4	Methylene Chloride	6.0		2-Chloroethylvinyl Ether ND
1	S.	Trichlorofluoromethane	4		Bromoform ND
H-56		1, 1-Dichloroethene	Q	1, 1,	1,1,2,2-Tetrachloroethane # ND
	9	1, 1-Dichloroethane	e 7		Tetrachloroethylene # ND
		trans-1,2-Dichloroethene	Q	6	Chlorobenzene 5.7
	7	Chloroform	1.0		1, 3-Dichlorobenzene ND
		1,2-Dichloroethane	R		1, 2-Dichlorobenzene ND
		1,1,1-Trichloroethane	QN	10	1, 4-Dichlorobenzene 6.0
		Carbon Tetrachloride	QN		
		Bromodichloromethane	QN		
	1	1,2-Dichloropropane	Q		
	ļ	trans-1,3-Dichloropropene	Q		

Serv Results by Sample Analytical Serv RECEIVED: 07/18/84

LAB # 84-07-090 Continued From Above

CONTRACTOR CONTRACTOR STATEMENT

SAMPLE 10 7F

FRACTION 03A TEST CODE GC 601 NA Date & Time Collected not specified

NAME EPA Method 601/GC ed Category

NOTES AND DEFINITIONS FOR THIS REPORT

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute uq/L unless otherwise specified SCAN = scan number or retention time on chromatogram All results reported in

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE PAGE 8 RECEIVED: 07/18/84

RECEIVED: 07/18/84

Analytical Serv REPORT 04/26/85 11:55:37

LAB # 84-07-093

CONTRACTOR AND THE CONTRACTOR AN

PREPARED Radian Analytical Services ¥ REPORT Radian Austin 8

Austin, Texas 78766 8501 MoPac Blvd P. O. Box 9948

(512) 454-4797

ERTIFIED BY

ATTEN

CONTACT CONDVER

SAMPLES

Tinker AFB

TINKER

CL IENT COMPANY FACILITY

William Little

ATTEN

Duplicate of report of OB/O9/84 6D, 6G Monitor Wells 7F,

7/16/84 - 7/17/84, NPS/HG

federal express

TRANS

WORK ID

TAKEN

212-027-21-05

3851

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Footnotes and Comments

* Indicates a value less than 5 times the detection limit. Potential error for such low values ranges between

50 and 100%

specific matrix was not within acceptable limits indicating @ Indicates that spike recovery for this analysis on the

an interferent present.

SAMPLE IDENTIFICATION

66, Bldg 3001

잉

의영영

7F, Area D

Analytical Serv TEST CODES and NAMES used on this report M625 A Method 625 Acid Compounds
M625 B Method 625 Base/Neutrals
M5 624 EPA Method 624/GC-M5

RECEIVED: 07/18/84

Serv REPORT Results by Sample Analytical Serv

LAB # 84-07-093

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SAMPLE ID 7F, Area D

NAME Method 625 Acid Compounds FRACTION OIA TEST CODE M625 A
Date & Time Collected 07/17/84

Category

COMPOUNDS DETECTED BY LAK	COMPOUND RESULT	4-nitrophenol ND	2,4-dinitrophenol ND	2-methyl-4, 6-dinitrophenol ND	pentachlorophenol ND	pheno! ND	
ANAL YST TRUMENT	EPA	58A	59A	60A	64A	65A	
ANALYST INSTRUMENT	NPDES SCAN	7A	9.4	44	9.4	10A	
07/25/84 07/31/84	RESULT N	CZ	S	Q	QN	Q	Q
ATE EXTRACTED DATE INJECTED		ophenol	phenol	phenol	phenol	[pheno]	phenol
DATE EX DATE II	OMPOUND	6-trichlor	_	2-chlorop	2, 4-dichlorop		2-nitrop
Ω	PA COMPOUND	1A 2, 4, 6-trichloro	4-chloro-3-methyl	2-chloro	2,4-dichloro	2, 4-dimethy	2-nitro
0 TOO	NPDES SCAN EPA COMPOUND	11A 21A 2,4,6-trichlor	_	1A 24A 2-chlorop	2A 31A 2,4-dichlorop		6A 57A 2-nitrop

NOTES AND DEFINITIONS FOR THIS REPORT.

ug/l unless otherwise specified. SCAN = scan number or retention time on chromatogram. All results reported in

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

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Analytical Serv REPORT Results by Sample

LAB # 84-07-093

0//18/84

B NAME Method 625 Base/Neutrals Category	BWS VERIFIED BY LAK COMPOUNDS DETECTED 3	COMPOUND	N-nitrosodimethylamine ND	N-nitrosodiphenylamine ND	N-nitrosodi-n-propylamine ND	bis(2-ethylhexyl)phthalate B	butyl benzyl phthalate ND	di-butyl phthalate ND	di-n-octyl phthalate ND	diethyl phthalate 32	dimethyl phthalate ND	benzo(a)anthracene A ND	benzo(a)pyrene	benzo(b)fluoranthene * ND	benzo(k)fluoranthene * ND	chrysene A ND	acenaphthylene ND	anthracene B ND
ION OIA TEST CODE M625 % Time Collected 07/17/84	ANALYST INSTRUMENT	ES SCAN EPA	41B 61B	43B 62B	42B 63B	13B 1640 66B	158 678	268 68B	29B 69B	248 1023 70B	258 718	5B 72B	8E. 73B	78 748	98 758	188 768	2B 77B	38 788
FRACTION O1A TI Date & Time Colle	07/25/84 07/31/84	RESULT NPDES	4	Q	ON A	Q Q	2	N ON	S	QN N	2	25	QN	Q	Q	Q	ᄝ	gv
FRACT	L DATE EXTRACTED DATE INJECTED	COMPOUND	acenaphthene	benzidine	1, 2, 4-trichlorobenzene	hexachlorobenzene	hexachloroethane	bis(2-chloroethyl)ether	2-chloronaphthalene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	3,3'dichlorobenzidine	2,4-dinitrotoluene	2, 6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene	ophenyl phenyl ether
. Area D	2CU07093C01	EPA	18	88	88 1, 3	98	12B	18B bis	20B	25B	26B	27B	28B 3,	358	368	37B 1.	398	40B 4-chlorophenyl
SAMPLE ID 7F, Area D	DATA FILE CONC. FACTOR	NPDES SCAN	18	48	468	338	368	118	н 168	80 ⊘ -61	218	228 493	238	278	288	298	318	178

밀 2 Z S NAME Method 625 Base/Neutrals benzo(ghi)perylene fluorene phenanthrene B dibenzo(a, h)anthracene indeno(1,2,3-cd)pyrene Category FRACTION OIA TEST CODE M625 B
Date & Time Collected 07/17/84 79B 8CB 818 82B 838 848 SCAN = scan number or retention time on chromatogram 88 32B 198 37B 45B 44B Ŷ S 윋 41B 4-bromophenyl phenyl ether 42B bis(2-chloroisopropyl)ether NOTES AND DEFINITIONS FOR THIS REPORT. nzene naphthalene bis (2-chloroethoxy)methane hexachlorobutadiene isophorone hexachlorocyclopentadiene SAMPLE ID 7F, Area D 43B **23B** 54B **52B** 55B 148 358 38B 12B 108 34B 39B H-62

LAB # 84-07-093 Continued From Above

Serv REPORT Results by Sample

Analytical Serv

PAGE 4 RECEIVED: 07/18/84

サンジの 重要 こうかのう 金属 こうちゅう 一層 マザ かんかい 可能の トラファ 大野 できない 気をなっている できない アンド

All results reported in <u>ug/l</u> unless otherwise specified

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

* = benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

A = benzo(a) anthracene and chrysene co-elute in high concentrations

= anthracens and phenanthrens co-elute in high concentrations

LAB # 84-07-093 REPORT Results by Sample Analytical Serv CORPORATION RECEIVED: 07/18/84

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S 2 S A E RESULT 밀 Ż 皇 웆 COMPOUNDS DETECTED VERIFIED BY NAME EPA Method 624/6C-MS bromoform tetrach loroethy lene vinyl chloride methyl chloride ch lorodibromomethane trichloroethylene 1, 2-dichloropropane cis-1, 3-dichloropropylene 33V trans-1, 3-dichloropropylene ethylbenzene methylene chloride methyl bromide dichlorobromomethane trichlorofluoromethane dichlorodifluoromethane toluene Category COMPOUND BMS TEST CODE MS 624 Date & Time Collected 07/17/84 ANALYST INSTRUMENT 336 200 517 830 860 877 880 794 470 480 497 EPA 320 380 440 450 NPDES SCAN 520 314 190 214 205 124 30°E 13 248 255 294 17 184 186 224 ັ ທ 8 DATE INJECTED 07/25/84 밀 2 운 FRACTION 01B RESULT 9 g 9 2 읒 욷 2 1, 2-trans-dichloroethylene chloroform 1, 1-dichloroethylene acrolein acrylonitrile 2-chloroethylvinyl ether carbon tetrachloride chlorobenzene 1, 1, 1-trichloroethane 1, 1-dichloroethane 1, 1, 2-trichloroethane 1, 1, 2, 2-tetrachloroethane chloroethane bis (chloromethyl) ether benzene 1, 2-dichloroethane COMPOUND DATA FILE 2CU07093V01 SAMPLE ID 7F, Area D > 90 90 EPA <u>გ</u> 150 160 17 190 234 30₹ 110 134 140 295 ₹ \$ 220 NPDES SCAN 339 267 <u>გ</u> **≥** ₹ 234 305 110 165 2 135 274 140 284 <u>چ</u> 8 **4** 5 H - 63

PAGE 6 RECEIVED: 07/18/84

Analytical Serv REPORT Results by Sample

LAB # 84-07-093 Continued From Above

SAMPLE ID 7F, Area D

FRACTION O1B TEST CODE MS 624
Date & Time Collected 07/17/84

NAME EPA Method 624/GC-MS Category

NOTES AND DEFINITIONS FOR THIS REPORT.

ug/1 unless otherwise specified. SCAN = scan number or retention time on chromatogram. All results reported in_

ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

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Analytical Serv REPORT Results by Sample

LAB # 84-07-093

CONTRACTOR CONTRACTOR CONTRACTOR

SAMPLE 10 60

FRACTION 02A TEST CODE M625 A
Date & Time Collected 07/17/84

NAME Method 625 Acid Compounds Category COMPOUNDS DETECTED BMB ANALYST INSTRUMENT DATE EXTRACTED 07/19/84
DATE INJECTED 07/24/84 CONC. FACTOR

P K

	RESULT	Q	Q	Q	QN .	Q	
	COMPOUND	4-nitrophenol	2, 4-dinitrophenol	2-methyl-4,6-dinitrophenol	pentachlorophenol	phenol	
	EPA	58A	59A	60A	64A	65A	
	NPDES SCAN	74	Ą.	4 4	6 6	10A	_ ••
	RESULT	ON	QN	GN	N	Q	Û
	COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2-nitrophenol
:	EPA	21A	22A	24A	314	34A	57A
	NPDES SCAN	114	88	41	2.A	₹ რ	6 A

AND DEFINITIONS FOR THIS REPORT. NOTES

SCAN = scan number or retention time on chromatogram.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84). ug/l unless otherwise specified. All results reported in

RECEIVED: 07/18/84 PAGE 8

REPORT Results by Sample Analytical Serv

LAB # 84-07-093

Y Y Ž 문 2 물 밀 밀 2 Ž g 일 2 S 9 일 문 RESULT NAME Method 625 Base/Neutrals VERIFIED BY COMPOUNDS DETECTED N-nitrosodimethylamine butyl benzyl phthalate diethyl phthalate N-nitrosodi-n-propylamine bis(2-ethylhexyl)phthalate di-butyl phthalate di-n-octyl phthalate dimethyl phthalate benzo(a)pyrene œ N-nitrosodiphenylamine acenaphthylene benzo(a)anthracene chrysene anthracene benzo(b)fluoranthene benzo(k)fluoranthene Category COMPOUND BMS FRACTION OZA TEST CODE M625 B Date & Time Collected 07/17/84 EPA 61B 66B 62B 63B 67B 889 **69B 70B** 71B 72B 73B 74B 758 76B 77B 788 ANALYST INSTRUMENT NPDES SCAN 1635 13B 41B 43B 26B 38 42B 158 29B 24B 25B 18B 2B SB 29 78 90 07/19/84 RESULT 2 2 밁 일 밁 9 2 S 밁 밁 2 Ŝ 2 2 ᄝ 밀 DATE EXTRACTED
DATE INJECTED acenaphthene benzidine 1, 2, 4-trichlorobenzene hexachlorobenzene hexachloroethane 2-chloronaphthalene 1, 2-dichlorobenzene 1, 3-dichlorobenzene 1, 4-dichlorobenzene 3, 3 'dichlorobenzidine 2, 4-dinitrotoluene 2,6-dinitrotoluene 1,2-diphenylhydrazine 408 4-chlorophenyl phenyl ether bis(2-chloroethyl)ether fluoranthene COMPOUND DATA FILE 2CU07093C02 EPA 1 B 9B 12B 188 20B 25B 26B 27B 288 37B **SB** 88 35B 36B 39B SAMPLE ID 6D NPDES SCAN 8 4 B 46B 33B 36B 1 1B 16B 20B 21B 22B 23B 27B 29B 318 17B 28B

i d n is n is	SAMPLE ID 60	10 60	FRACTI Date &	FRACTION <u>O2A</u> Date & Time Co	FRACTION <u>O2A</u> TEST CODE <u>M625</u> Date & Time Collected 07/17/84	M625 B	TEST CODE M625 B NAME Method 625 Base/Neutrals ected 07/17/84	2
42B bis(2-chloroisopropyl)ether ND 32B 80B 43B bis(2-chloroethoxy)methane ND 44B 81B 52B hexachlorocyclopentadiene ND 37B 83B 53B hexachlorocyclopentadiene ND 45B 83B 54B isophorone ND 45B 84B 55B naphthalene ND 45B 84B 55B scan number or retention time on chromatogram.	# # # # # # # # # # # # # # # # # # #	41B	4-bromophenyl phenyl	Q	88	798	ylene	2
43B bis(2-chloroethoxy)methane ND 44B 81B 82B hexachlorobutadiene ND 19B 82B 83B 53B hexachlorocyclopentadiene ND 37B 83B 84B somber or retention time on chromatogram.	128	428	bis(2-chloroisoprop	Q	32B	808	fluorene	ᄝ
52B hexachlorobutadiene ND 178 82B 53B hexachlorocyclopentadiene ND 27B 83B 54B isophorone ND 245B 84B AND DEFINITIONS FOR THIS REPORT. nzene ND 2 55AN = scan number or retention time on chromatogram.	108	43B	~	QN	44B	818	phenanthrene B	2
53B hexachlorocyclopentadiene ND 37B 83B 54B isophorone ND 45B 84B AND DEFINITIONS FOR THIS REPORT nzene ND 55AN = scan number or retention time on chromatogram.	0.4B	52B		QN	198	828	dibenzo(a,h)anthracene	2
55B naphthalene ND i 45B AND DEFINITIONS FOR THIS REPORT nzene ND i SCAN = scan number or retention time on chromatogram.	838	53B		QN	37B	838	indeno(1, 2, 3-cd)pyrene	2
S5B AND DEFINITIONS FOR THIS REPOR	388	S4B		QN	45B	848	eueryd	ğ
AND DEFINITIONS FOR THIS REPOR	398	55B	naphthalene	QN				
SCAN = scan number or retenti		ND DEFINI		QN				
		CAN = SC	or retenti	n chroma	togram.			

LAB # 84-07-093 Continued From Above

Analytical Serv REPORT Results by Sample

PAGE 9 RECEIVED: 07/18/84

All results reported in ug/1 unless otherwise specified.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

= benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

= benzo(a)anthracene and chrysene co-elute in high concentrations. = anthracene and phenanthrene co-elute in high concentrations

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Ş 9 S TAX A 뮏 2 2 9 문 물 Ş 문 Z ĝ RESULT VERIFIED BY COMPOUNDS DETECTED. NAME EPA Method 624/GC-MS methylene chloride methyl chloride bromoform tetrach loroethy lene tolvene trich loroethy lene vingl chloride 33V trans-1, 3-dichloropropylene methyl bromide dichlorobromomethane trichlorofluoromethane dichlorodifluoromethane chlorodibromomethane 1, 2-dichloropropane cis-1, 3-dichloropropylene ethylbenzene LAB # 84-07-093 Category COMPOUND F4 TEST CODE MS 624 Date & Time Collected 07/17/84 330 497 200 215 88 860 874 880 380 44 450 794 47 487 ANALYST INSTRUMENT EPA 327 NPDES SCAN serv Results by Sample 8 244 255 297 310 184 212 3 3 3 134 184 767 224 202 <u>ک</u> 72 170 DATE INJECTED 07/25/84 밀 S 2 9 2 ĝ S g 2 S FRACTION 02B 2 일 욷 Ş RESULT Analytical Serv chloroform 1, 2-trans-dichloroethylene acrolein acrylonitrile carbon tetrachloride chlorobenzene chloroethane 2-chloroethylvinyl ether 1, 1-dichloroethylene benzene 1, 2-dichloroethane 1, 1, 1-trichloroethane 1, 1-dichloroethane 1, 1, 2-trichloroethane 1, 1, 2, 2-tetrachloroethane bis (chloromethyl) ether COMPOUND DATA FILE 4CU07093V02 RECEIVED: 07/18/84 > 90 8 EPA გ 110 13< 140 150 160 17 190 234 202 295 ე ე **4 >** ? SAMPLE 1D 6D NPDES SCAN 481 PAGE 10 ? 2 275 284 23₹ 305 110 165 267 **⇔** 150 140 ? \$ 200 3

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RECEIVED: 07/18/84

Serv Results by Sample Analytical Serv

LAB # 84-07-093 Continued From Above

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SAMPLE ID 6D

NAME EPA Method 624/GC-MS Category

FRACTION 02B TEST CODE MS 624
Date & Time Collected 07/17/84

SCAN = scan number or retention time on chromatogram. NOTES AND DEFINITIONS FOR THIS REPORT.

All results reported in uq/l unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

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REPORT Analytical Serv REPO Results by Sample

LAB # 84-07-093

TOTAL MANAGEMENT CONCRETE

SAMPLE ID 66, Bldg 3001

NAME Method 625 Acid Compounds FRACTION 03A TEST CODE M625 A
Date & Time Collected 07/16/84

Category

BMB ANALYST INSTRUMENT DATE EXTRACTED 07/25/84
DATE INJECTED 07/31/84 DATA FILE 2CU07093C03

VERIFIED BY COMPOUNDS DETECTED

A O

RESULT	Q	S	Q	S	QN	
COMPOUND	4-nitrophenol	2, 4-dinitrophenol	2-methyl-4,6-dinitrophenol	pentachlorophenol	phenol	
EPA	SBA	SPA	₩ 09	64A	65A	
NPDES SCAN	7A	A to	44	94	10A	
ă			- -			
RESULT	Q	S	9	Q	9	Q
COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2-nitrophenol
EPA	21A	22A	24A	314	344	57A
NPDES SCAN	114	84	14	2 A	34	6 A
ğ	***	~		H-7		•

AND DEFINITIONS FOR THIS REPORT. NOTES

SCAN = scan number or retention time on chromatogram.

ug/l unless otherwise specified All results reported in

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

AD/CILTA PAGE 13

REPORT Analytical Serv

LAB # 84-07-093

	B NAME Method 625 Base/Neutrals Category	BWS VERIFIED BY LAK COMPOUNDS DETECTED 2	COMPOUND RESULT	N-nitrosodimethylamine ND	N-nitrosodiphenylamine ND	N-nitrosodi-n-propylamine ND	bis(2-ethylhexyl}phthalate 12	butyl benzyl phthalate NB	di-butyl phthalate ND	di-n-octyl phthalate 12	diethyl phthalate ND	dimethyl phthalate ND	benzo(a)anthracene A ND	benzo(a)pyrene ND	benzo(b)fluoranthene * ND	benzo(k)fluoranthene * ND	chrysene A ND	acenaphthylene ND	anthracene B ND	
	DE M625 7/16/84	ANALYST INSTRUMENT	N EPA	61B	628	8E9	4 66B	67B	889	9 69B	708	718	728	738	748	758	768	778	788	
Samp le	TEST CODE lected 07/1	A TRN1	NPDES SCAN	418	438	42B	13B 1644	158	26B	298 1829	248	258	8	6 B	78	98	188	28	ag e	
Results by	R Time Collected 07/16/84	07/25/84	RESULT N	Q	Q	9	Q N	Ö	9	QN	Ö	QN	Ü	QN	Q N	Q	CZ	g	Q	•
o≍ ga	FRACTION O3A Date & Time	DATE EXTRACTED O	COMPOUND	acenaphthene .	benzidine	1, 2, 4-trichlorobenzene	hexachlorobenzene	hexachloroethane	bis(2-chloroethyl}ether	2-chloronaphthalene	1,2-dichlorobenzene	1, 3-dichlorobenzene	1, 4-dichlorobenzene	3,3'dichlorobenzidine	2, 4-dinitrotoluene	2, 6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene	nenyl phenyl ether	
<u>~</u>	100 3001	DATA FILE <u>2CU07093003</u> CONC. FACTOR	J			1,2,4			b i s (2-	Ń	+	<u></u>	4	e e	•	(0	1, 2,		40B 4-chlorophenyl	
RECEIVED: 07/13/84	SAMPLE ID 66, Bldg 3001	FILE 2CL	CAN EPA	18	5B	88	98	12B	188	208	258	26B	278	288	358	36B	37B	398	40B	
RECEIVE	SAMPLE	DATA CONC. FA	NPDES SCAN	18	48	468	333	368	118	89 H-7	80 2	218	22B	23B	278	288	298	318	17B	

RECEIV	RECEIVED: 07/18/84	/118/	8	ž	Results by Sample	Sample		Continued From Above	
SAMPLE	10 66,		SAMPLE ID 66, BIdg 3001	FRACTI Date	FRACTION 03A TEST CODE M625 Date & Time Collected 07/16/84	TEST C	TEST CODE M625 B ected 07/16/84	NAME Method 625 Base/Neutrals Category	× .
148	4	41B	4-bromophenyl phen	// phenyl ether	Q	88	79B	benzo(ghi)peryleneN	2
12B	•	42B	bis (2-chloroisoprop	isopropyl)ether	Q	32B	808	fluorene	2
108	•	43B	bis(2-chloroethoxy)ethoxy}methane	Q	44B	818	phenanthrene B N	2
34B	•,	52B	hexac	hexachlorobutadiene	Q	198	828	dibenzo(a, h)anthracene	2
358	-,	53B	hexachlorocyclope	gclopentadiene	QN	378	838	indeno(1,2,3-cd)pyrene N	2
388	•,	24B		isophorone	2	458	848	N suarfid	2
398	•,	55B		naphthalene	Q				
NOTES	AND DEF	FINI	NOTES AND DEFINITIONS FOR THIS REPO	IS REPORT, nzene	Q				
H-72	SCAN =	₩ Ω	SCAN = scan number or retenti		on time on chromatogram	togram.			

LAB # 84-07-093

REPORT

Analytical Serv

= benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

 $ND \approx not$ detected at EPA detection limit method 625, (Federal Register, 11/26/84).

ug/l unless otherwise specified.

All results reported in

A = benzo(a)anthracene and chrysene co-elute in high concentrations.

= anthracene and phenanthrene co-elute in high concentrations

PAGE 15 RECEIVED: 07/18/84

Analytical Serv REPORT Results by Sample

LAB # 84-07-093

NAME EPA Method 624/GC-MS Category	BWS VERIFIED BY LAK	COMPOUND	1, 2-dichloropropane ND	cis-1, 3-dichloropropylene ND	trans-1,3-dichloropropylene ND	ethylbenzene ND	methylene chloride 21	methyl chloride ND	methyl bromide ND	bromoform ND	dichlorobromomethane ND	trichlorofluoromethane ND	dichlorodifluoromethane ND	chlorodibromomethane ND	tetrachloroethylene ND	toluene 670	trichloroethylene ND	vinyl chloride ND
TEST CODE MS 624 ected 07/16/84	ANALYST INSTRUMENT	SCAN EPA	320	∆66	330	380	127 440	>84	467	470	486	49V	200	510	850	455 B6V	>78	987
FRACTION 03B TEST CODE MS 6 Date & Time Collected 07/16/84	07/25/84	RESULT NPDES	VD 177	ND 180	47 187	761 IN	ND 22V	ND : 21V	ND : 20V	>c QN	VD 12V	NOE 30N	ND 130	AB GN	ND : 24V	ND : 25V	VPS : QN	ND : 31V
	DATE INJECTED 0	COMPOUND	acrolein	acrylonitrile	penzene	carbon tetrachloride _	chlorobenzene	1,2-dichloroethane _	1, 1, 1-trichloroethane	1,1-dichloroethane _	1, 1, 2-trichloroethane	1, 1, 2, 2-tetrachloroethane	chloroethane	bis (chloromethyl) ether	2-chloroethylvinyl ether	chloroform	1,1-dichloroethylene	1,2-trans-dichloroethylene
SAMPLE ID 66, B1dq 3001	4CU07093V03	J				TO U		-	1, 1,		1, 1,							
	DATA FILE 4CL	SCAN EPA	2	36	336 40	79	>	100	110	134	140	150	167	170	190	230	290	306
SAMPLE	DA1 CONC.	NPDES	2	8	>e	^9	2	150	≳ H-73	140	287	230	\$	4	100	110	167	267

RECEIVED: 07/18/84

Serv REPORT Results by Sample Analytical Serv

LAB # 84-07-093 Continued From Above

SAMPLE ID 66, BIdg 3001

FRACTION 03B TEST CODE MS 624
Date & Time Collected 07/16/84

NAME EPA Method 624/GC-MS Category

AND DEFINITIONS FOR THIS REPORT. NOTES

SCAN = scan number or retention time on chromatogram.

ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79). uq/1 unless otherwise specified. All results reported in

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Analytical Serv REPORT NonReported Work PAGE 17 RECEIVED: 07/18/84

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

DUP 624 DUP 624 DUP 624

01C 02C 03C

H-75

* Indicates a value less than 5 times the detection limit. e Indicates that spike recovery for this analysis on the second column confirmation performed on all four Potential error for such low values ranges between PREPARED Radian Analutical Services Footnotes and Comments Duplicate of report of OB/O7/84. Austin, Texas 78766 samples on this work order 8501 MoPac Blvd (512) 454-4797 Box 9948 Analytical Serv REPORT 04/26/85 11:57:49 50 and 100% ATTEN SAMPLES ATTEN William Little 212-027-21-05 Tinker AFB WORK ID Wells, 601 RECEIVED: 07/20/84 REPORT Radian TO, B1. 4 Austin CLIENT TINKER COMPANY FACILITY TRANS TAKEN H-77

CONTACT CONDVER

なる。特別ではなるとなるない。

LAB # 84-07-112

specific matrix was not within acceptable limits indicating Analytical Serv TEST CODES and NAMES used on this report an interferent present

SAMPLE IDENTIFICATION

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PAGE 2 RECEIVED: 07/20/84

Analytical Serv REPORT Results by Sample

LAB # 84-07-112

SCAN COMPOUND RESULT SCAN COMPOUND	SAMPLE ID 6A DATA FILE CONC. FACTOR	8	FRACT Date DATE INJECTED	FRACTION OIA TEST CODE Date & Time Collected not NUECTED O7/25/84 INSTRUM	PEST CODE GC 601 NAME EPA Method 601/GC etted not specified Category ANALYST RGS MCL COMPOUNDS DETERMINISTRUMENT BOS MCL COMPOUNDS DETERMINISTRUMENT	IFIED NAME EPA	Category Verified BY	987
Chloromethane ND Dibromochlorom Vinyl Chloride ND 1,1,2-Trichloro Chloroethane ND Cis-1,3-Dichlorop Methylene Chloride ND Cis-1,3-Dichlorop Trichlorofluoromethane 1,2 C-Chloroethylvi I,1-Dichloroethane 1,2 C-Chloroethylvi Chloroform ND Chloroethane 2,6 Chloroethylorop I,2-Dichloroethane 2,6 Chloroethylorop I,2-Dichloroethane 4,2 Chloroethylorop Strans-1,2-Dichloromethane ND Carbon Tetrachloride ND Carbon Tetrachloropane 0,3 I,2-Dichloropropane ND Trans-1,3-Dichloropropane ND Trans-1,3-Dichlor	SCAN	מֿט	MPOUND	RESULT	SCAN	COMP		RESULT
Bromomethane ND 1,1,2-Trichloro Chloroethane ND 2-Chloroethylvi Trichloroethene 1,2 1 1,1-Dichloroethene 1,2 1 1,1-Dichloroethene 1,2 1 1,1-Dichloroethene 1,2 1 1,1-Dichloroethene 1,4 9 Tetrachloroethoroethene 1,3-Dichloroethoro 1,2-Dichloroethane 2,6 1,3-Dichloroethoroethane 1,2-Dichloroethane 2,6 1,2-Dichloroethane 1,2-Dichloroethane 1,2-Dichloroethane 0,3 1,2-Dichloroethane 0,3 1,2-Dichloroethane 0,3 1,2-Dichloropropene ND 1,2-Di			Chloromethane		8	-	Trichloroethene	642
Chloroethane ND cis-1,3-Dichlorop Methylene Chloride ND Cis-1,3-Dichlorop Methylene Chloride ND C-Chloroethylvi Trichlorofluoromethane 1,2 1,1,2,2-Tetrachloroethylvi 1,1-Dichloroethane 1,4 9 Tetrachloroethylvi Chloroform ND 1,2-Dichloroethane 2,6 1,3-Dichlo 1,2-Dichloroptopane 0,3 1,4-Dichloroptopane 0,3 1,2-Dichloroptopane 0,3 1,2-Dichloroptopane 0,3 1,2-Dichloroptopane ND 1,3-Dichloroptopane ND 1,3-Dichloroptopan			Bromomethane			Dibromoch	nloromethane *	9
Chloroethane ND Cis-1,3-Dichloroethylvi Cis-1,3-Dichloroethylvi Cis-1,3-Dichloroethylvi Cis-1,3-Dichloroethylvi Cis-1,2-Tetrachloroethylvi Chloroethane 1.4 9 Tetrachloroethylvi Chloroform ND Chloroform ND Chloroethane 2.6 Chloroethane 4.2 Carbon Tetrachloride ND Carbon Tetrachloride ND Carbon Tetrachloropane O.3 Cansolichloropropane O.3 Ca			Ç			1, 1, 2-Tric	chloroethane *	S
Trichlorofluoromethane 1.2 1,1,2,2-Tetrachloroet 1,1-Dichloroethane 1.4 9 Tetrachloroet 1,1-Dichloroethane 1.4 9 Tetrachloroet 1,1-Dichloroethane 1.8 1 Chloroform ND 1,2-Dichloroethane 2.6 1,2-Dichloromethane ND 1,2-Dichloropropane 0.3 1,2-Dichloropropane 0.3 1,2-Dichloropropene ND 1,2-Dichloro			Chloroethane			cis-1, 3-Dich	hloropropene *	N
Trichlorofluoromethane 1,2 1,1,2,2-Tetrachloro 1,1-Dichloroethene 1,4 9 Tetrachloroet trans-1,2-Dichloroethene 1,8,1 Chloroform ND 1,2-Dichloroethane 2,6 1,2-Dichloroethane 4,2 1,1,1-Trichloroethane 4,2 1,4-Dichloropropane 0,3 1,2-Dichloropropane 0,3 trans-1,3-Dichloropropene ND		χ	O			2-Chloroet	thylvinyl Ether	S
1,1-Dichloroethene 1.7 1,1,2,2-T 1,1-Dichloroethene 1.4 9 Tet 1,1-Dichloroethene 1.8 9 Tet Chloroform ND	-	Trichlo	orofluoromethane	ri			Bromoform	Q
trans-1,2-Dichloroethane 1.4 Chloroform ND Chloroform ND Chloroethane 2.6 1,1,1-Trichloroethane 4.2 Carbon Tetrachloride ND Bromodichloropropane 0.3 1,2-Dichloropropene ND trans-1,3-Dichloropropene ND	C	1.1	1-Dichloroethene		1,1	1, 2, 2-Tetrac	chloroethane #	Q
oethene 18.1 oethane 2.6 oethane 4.2 hloride ND methane O.3 propene O.3	C	1.1		1	6	Tetrachi	loroethylene #	4
oroform ND oethane 2.6 hloride ND propane 0.3 propene ND	4	trans-1,6		18			Chlorobenzene	Q
oethane 2.6 h loride ND h propane 0.3 h propene ND h			Chloroform			1, 3–6	1,3-Dichlorobenzene	ND.
oethane 4.2 h loride ND methane ND propane 0.3 propene ND in the notation of t	ស	***		ni		1,2-0	1, 2-Dichlorobenzene	S
hloride methane propane O	9	1,1,1				1,4-	1, 4-Dichlorobenzene	2
methane propane propene		Carbo	on Tetrachloride					
propane propene		Bromc	odichloromethane					
propene	7	1,2-		0				
		trans-1,3-	-Dichloropropene					

PAGE 3 RECEIVED: 07/20/84

Serv REPORT Analytical Serv

LAB # 84-07-112 Continued From Above

SAMPLE 10 6A

FRACTION OIA TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

Category

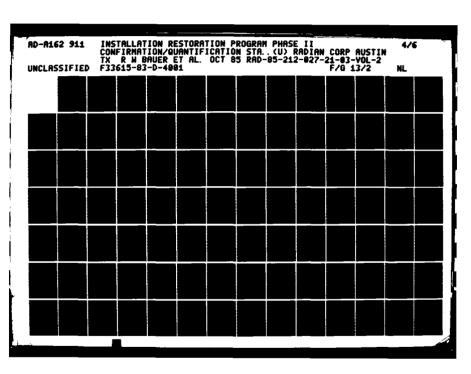
NOTES AND DEFINITIONS FOR THIS REPORT.

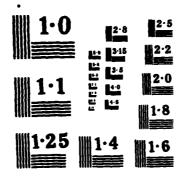
*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. ug/L unless otherwise specified. SCAN = scan number or retention time on chromatogram. All results reported in

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		0	1000	C ** PC ** C ** C **
PAGE 4 RECEIVED: 07/20/84	I a file was the state of the s	cal serv Results by S	Sample	LAB # 84-U/-112
SAMPLE ID 6B		FRACTION O2A TEST CODE Date & Time Collected not		GC 601 NAME EPA Method 601/GC specified Category
DATA FILE	B DATE INJEC	ECTED <u>07/25/84</u>	ANALYST INSTRUMENT	T RGS VERIFIED BY JSG
SCAN	COMPOUND	RESULT	SCAN	COMPOUND
	Chlorometh	thane ND	9	Trichloroethene 102
	Bromometh	thane ND		Dibromochloromethane * ND
-	Vingl Chlor	oride ND		1, 1, 2-Trichloroethane * ND
1	Chloroeth	thane ND		cis-1,3-Dichloropropene * ND
1	Methylene Chlor	oride 0.9		2-Chloroethylvinyl Ether NB
Cu	Trichlorofluorometh	thane 2.7		Bromoform ND
80	1,1-Dichloroeth	thene ND	-	1, 1, 2, 2-Tetrachloroethane # ND
e	1,1-Dichloroeth	thane 1.4	7	Tetrachloroethylene # 1.7
4	trans-1,2-Bichloroeth	thene 33.2	8	Chlorobenzene 1.3
	Chlorof	oform ND		1,3-Dichlorobenzene ND
	1,2-Dichloroeth	thane ND	0-	1, 2-Dichlorobenzene 1.1
יט	1,1,1-Trichloroeth	thane 0.2		1,4-Dichlorobenzene ND
	Carbon Tetrachlor	oride ND		
	Bromodichlorometh	thane ND		
	1,2-Dichloroprop	opane ND		
	trans-1,3-Dichloroprop	opene ND		





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RECEIVED: 07/20/84

Analytical Serv REPORT Results by Sample

LAB # 84-07-112 Continued From Above

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SAMPLE 1D 6B

NAME EPA Method 601/GC ed Category FRACTION O2A TEST CODE GC 601 No Date & Time Collected not specified

NOTES AND DEFINITIONS FOR THIS REPORT

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute ug/L unless otherwise specified SCAN = scan number or retention time on chromatogram

RECEIVED: 07/20/84

REPORT Results by Sample Analytical Serv

LAB # 84-07-112

얾 RESULT 皇 9 VERIFIED BY COMPOUNDS DETECTED Trichloroethene 2-Chloroethylvinyl Ether Bromoform Chlorobenzene NAME EPA Method 601/GC 1, 1, 2, 2-Tetrachloroethane Tetrach loroethy lene Dibromoch loromethane 1, 1, 2-Trichloroethane cis-1, 3-Dichloropropene Category COMPOUND RGS FRACTION 03A TEST CODE GC 601 No Date & Time Collected not specified ANALYST INSTRUMENT SCAN DATE INJECTED 07/26/84 9 S 3 2 RESULT Chloromethane Vinyl Chloride Chloroethane 1, 1-Dichloroethane Bromomethane Methylene Chloride 1, 1-Dichloroethene trans-1, 2-Dichloroethene Trichlorofluoromethane COMPOUND DATA FILE CONC. FACTOR SAMPLE ID 60 SCAN

H-82

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1, 4-Dichlorobenzene

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Bromodichloromethane

윋

Carbon Tetrachloride

1, 1, 1-Trichloroethane

윋

1, 2-Dichloropropane

윋

trans-1, 3-Dichloropropene

1, 2-Dichlorobenzene

1, 3-Dichlorobenzene

0

Chloroform

2

1, 2-Dichloroethane

PAGE 7 RECEIVED: 07/20/84

Serv Results by Sample Analytical Serv

LAB # 84-07-112 Continued From Above

THE ASSAULT PRODUCT SECOND GRAND

SAMPLE ID 60

NAME EPA Method 601/GC

FRACTION O3A TEST CODE GC 601 NA Date & Time Collected not specified

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. = not detected at EPA detection limit method 601, (Federal Register, 12/3/79) #1,1,0,2-tetrachlorosthans and tetrachlorosthylens co-slute SCAN = scan number or retention time on chromatogram All results reported in

RECEIVED: 07/20/84

REPORT Results by Sample Analytical Serv

THE SECTION CONTRACTOR BUILDING TRACTORS OF RECESSION INSURABLE OF

LAB # 84-07-112

ACCEPTAGE SAME SAME CONTRACTOR

NAME EPA Method 601/GC Category. FRACTION 04A TEST CODE GC 601 N Date & Time Collected not specified SAMPLE 1D 76

영 月 물 RESULT COMPOUNDS DETECTED Trichloroethene 2-Chloroethylvinyl Ether Bromoform 1, 3-Dichlorobenzene 1, 2-Dichlorobenzene 1, 4-Dichlorobenzene Chlorobenzene 1, 1, 2, 2-Tetrach loroethane Dibromochloromethane 1, 1, 2-Trich loroethane Tetrach loroethylene cis-1, 3-Dichloropropene COMPOUND RGS b ANALYST INSTRUMENT SCAN DATE INJECTED 07/26/84 윋 2 9 윋 윋 윋 윋 윋 윋 윋 밀 RESULT Vinyl Chloride Ch loromethane Methylene Chloride Trichlorofluoromethane 1, 1-Dichloroethane Chloroform 1, 2-Dichloroethane 1, 1, 1-Trichloroethane Bromomethane Chloroethane 1, 1-Dichloroethene trans-1, 2-Dichloroethene Carbon Tetrachloride Bromodich loromethane COMPOUND DATA FILE CONC, FACTOR SCAN H-84

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trans-1, 3-Dichloropropene

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1, 2-Dichloropropane

PAGE 9 RECEIVED: 07/20/84

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Serv Results by Sample Analytical Serv

LAB # 84-07-112 Continued From Above

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SAMPLE ID 76

NAME EPA Method 601/GC Category

FRACTION 04A TEST CODE GC 601 NA Date & Time Collected not specified

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute ND = not detected at EPA detection limit method 601, (Federal Register, #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute us/L unless otherwise specified. SCAN * scan number or retention time on chromatogram All results reported in

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Serv NonReported Work FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE PAGE 10 RECEIVED: 07/20/84

DUP 601 DUP 601 DUP 601 01B 02B 03B 04B

RECEIVED: 07/20/84

REPORT Radian TO B1. 4

Austin

TINKER

CLIENT COMPANY FACILITY

ATTEN

Anaiytical Serv 04/26/85 11:59:17

LAB # 84-07-113

REPORT

PREPARED Radian Analutical Services Austin, Texas 78766 8501 MoPac Blvd (512) 454-4797 P. O. Box 9948 × PHONE ATTEN C SAMPLES William Little Tinker AFB

CONTACT CONDVER

Duplicate of report of 08/20/84

Footnotes and Comments

* Indicates a value less than 5 times the detection limit. low values ranges between Potential error for such 50 and 100%

212-027-21-05

sediments

MORK ID TAKEN Fed Ex

TRANS

TYPE

INC.

specific matrix was not within acceptable limits indicating @ Indicates that spike recovery for this analysis on the an interferent present.

SAMPLE IDENTIFICATION

TSED-23 TSED-28 TSED-20 ସଥର

Special Disestion Method Analytical Serv TEST CODES and NAMES used on this report PREP W PREP X SE GA Silver, ICPES

Special Digestion Method

otal Organic Carbon Selenium, low level

Zinc, ICPES

TOC ZN E

low level hromium, ICPES admium, ICPES Barium, ICPES otal Cuanide opper, ICPES Arsenic, CNTOTA AS GA CDE SCE

RCRA Pesticides ead, low level Vickel, ICPES ditrate, P 1 RCRA NO3 IC

Total Phenolics PCBs in Soil PB GA PCB SS PHEN A

H-87

ercure, Cold Vapor

CRA Herbicides

HIRCRA

HO CA

·lugride, IC

fanganese, ICPES

Analytical Serv REPORT RESULTS BY TEST

LAB # 84-07-113

	. (entered units)	(entered units)	(entered units)	
AG E		7	7	
ug/m1	6/6n	5/6n	6/6n	
AS GA	 -	ー	-	
ug/m1	6/60 ;	5/57	6/80	
₩ •		610	2	
ug/m1	6/60 ;	5/50	5/50	
س 3	L.I.	0. 97	6 6	
ug/m1	6/60 ;	5/60	5/5n	
CNTDTA	 	5	5	
mg/L	••			
™	<u></u>	8	C4	
ug/m1	6/60	5/50	5/50	
S		സ താ	C)	
ug/m1	6/60	5/60	6/50	
الله الله	œ	K	n Cú	
mg/L	••			
He CA		0	o sa	
0g/m1	5/50	5/50	6/50	
س آ	470	250	50	
ug/ml	6/60	5/5n	6/60	
<u></u>	O~	യ്	o~ uri	
C9/m1	6/60	5/60	6/60	
ND3_IC	<u></u>	സ്	ന്ദ് സ്	
mg/L		,		
PB_GA	 53.00	coi	 cci	
ug/ml PCB SS	6/60 0 036	6/6/05/9	6/67 0>	
5/60	i ug Ar 1260/g			

REPORT LAB # 84-07-113 TEST CONTINUED FROM ABOVE	₹.01	6. 37	07/31/84	07/31/84	<.002	0, 85 0. 85	% CO OO	70 - PI
Analytical Serv REPORT RESULTS BY TEST	√ 01	7.30	07/31/84	07/31/84	<.002	0.30	50 ×	71 78 9
	\ 0.01	7.30	07/31/84	07/31/84	< 005	1.30	ري د دي د د د	n n
PAGE 3 RECEIVED: 07/20/84	PHEN	₩			SE GA	9/m] : TDC	ZN E	

VERIFIED BY LLN DET. LIMIT VERIFIED BY LLN DET. LIMIT FRACTION OIB TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified
Category NAME RCRA Pesticides Category RESULT RESULT All results reported in micrograms/liter unless otherwise specified. FRACTION OIB TEST CODE PIRCRA NA Date & Time Collected not specified OTHER PESTICIDES OTHER HERBICIDES DATE INJECTED 08/16/84 DATE INJECTED 08/18/84 ANALYST MSF NOTES AND DEFINITIONS FOR THIS REPORT. $ND \approx not$ detected at the specified detection limit. DET. LIMIT DET. LIMIT 2.0 1.0 1.0 皇 S 뫼 RESULT RESULT CONCENTRATION FACTOR 10 CONCENTRATION FACTOR 10 COMPOUND COMPOUND 2,4-0 2, 4, 5-TP (Silver) Lindane SAMPLE 10 TSED-20 SAMPLE 10 TSED-20

LAB # 84-07-113

Serv REPORT Results by Sample

Analytical Serv

RECEIVED: 07/20/84

PAGE 4

NOTES AND DEFINITIONS FOR THIS REPORT.

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Endrin

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Methoxychlor

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Toxaphene

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7	LAB # 84-U/-113 Continued From Above	Pesticides Category		Herbicides Category	VERIFIED BY LLN	DET. LIMIT				NAME RCRA Pesticides	VERIFIED BY LLN	DET. LIMIT				
# # #	Contin	NAME RCRA	pecified.	NAME RCRA	>	RESULT			pecified.	NAME RCRA	3	RESULT				
	KEPURI Sample	ACTION OIB TEST CODE PIRCRA NAME RCRA Pesticides ite & Time Collected not specified Category	cified detection limit. .ograms/liter unless otherwise specified.	FRACTION O2B TEST CODE HIRCRA NAME RCRA Herbicides Date & Time Collected not specified Category	DATE INJECTED 08/18/84 ANALYST SF	OTHER HERBICIDES			DEFINITIONS FOR THIS REPORT. e specified detection limit. micrograms/liter unless otherwise specified.	FRACTION 02B TEST CODE PIRCRA N Date & Time Collected not specified	DATE INJECTED 08/16/84 ANALYST MSF	OTHER PESTICIDES				
() ()	Analytical Serv Results by Sample	FRACTION O1B Date & Time Co	the specified detection limit. in micrograms/liter unless oth	FRACTION O2B Date & Time Co	DATE	DET. LIMIT	1.0	1.0	AND DEFINITIONS FOR the specified detection micrograms/liter	FRACTION OZB Date & Time Co	DATE	DET. LIMIT	200	2.0	20.	
_	Ğ		sected at reported		08/16/84	RESULT	QN	QN	NOTES tected at reported		08/13/84	RESULT	ON	ON	ON	
CONTRACTOR	PAGE 3 RECEIVED: 07/20/84	SAMPLE ID TSED-20	ND = not de All results	SAMPLE 10 TSED-23	DATE EXTRACTED CONCENTRATION FACTOR	COMPOUND	2, 4-D	2, 4, 5-TP (Silvex)	H-91 H-91 H-91 Tesuits	SAMPLE ID TSED-23	DATE EXTRACTED CONCENTRATION FACTOR	COMPOUND	Lindane	Endrin	Methoxychlor	.1

VERIFIED BY LLN VERIFIED BY LLN Continued From Above DET. LIMIT FRACTION 03B TEST CODE PIRCRA NAME RCRA Pesticides Date & Time Collected not specified Category FRACTION 02B TEST CODE PIRCRA NAME RCRA Pesticides
Date & Time Collected not specified
Category FRACTION 03B TEST CODE HIRCRA NAME RCRA Herbicides
Date & Time Collected not specified Category RESULT All results reported in micrograms/liter unless otherwise specified. All results reported in micrograms/liter unless otherwise specified DATE INJECTED 08/16/84 ANALYST MSF DATE INJECTED 08/16/84 ANALYST MSF OTHER HERBICIDES NOTES AND DEFINITIONS FOR THIS REPORT. NOTES AND DEFINITIONS FOR THIS REPORT. ND = not detected at the specified detection limit. ND'= not detected at the specified detection limit. Results by Sample DET. LIMIT -20 2 S 皇 RESULT DATE EXTRACTED 08/13/84 DATE EXTRACTED 08/13/84 2, 4-D CONCENTRATION FACTOR COMPOUND CONCENTRATION FACTOR Toxaphene 2,4,5-TP (Silvex) PAGE 6 RECEIVED: 07/20/84 SAMPLE 10 ISED-23 SAMPLE 10 TSED-28 SAMPLE 10 TSED-28

NO STOCKNOWN CONTROL OF THE STOCKNOWN

LAB # 84-07-113

REPORT

Analytical Serv

RECEIVED: 07/20/84

Analytical Serv REPORT Results by Sample

LAB # 84-07-113 Continued From Above

SAMPLE 10 TSED-28

FRACTION 03B TEST CODE PIRCRA NAME RCRA Pesticides
Date & Time Collected not specified

DET. LIMIT

RESULT

COMPOUND

20

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Lindane

S

Endrin

OTHER PESTICIDES

RESULT

All results reported in micrograms/liter unless otherwise specified.

NOTES AND DEFINITIONS FOR THIS REPORT.

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Toxaphene

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Methoxychlor

ND = not detected at the specified detection limit.

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DET. LIMIT

CONTRACTOR CONTRACTOR SONIES

RECEIVED: 07/23/84

Analytical Serv REPORT 04/26/85 12:00:28

LAB # 84-07-131

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CERTIFIED BY	CONTACT CONDVER				the detection limit. nges between		is analysis on the ble limits indicating
PREPARED <u>Radian Analutical Services</u> BY 8501 MoPac Blvd. P. O. Box 9948 Austin, Texas 78766			Duplicate of report of 08/17/84.	Footnotes and Comments	* Indicates a value less than 5 times the detection limit. Potential error for such low values ranges between	100%.	@ Indicates that spike recovery for this analysis on the specific matrix was not within acceptable limits indicating an interferent present.
PREPARE	ATTEN		Dup 1 ice		* Indic	50 and 100%.	Specifiant
REPORT <u>Radian</u> TO <u>B1. 4</u> Austin	ATTEN William Little	TINKER SAMPLES 6	CODE TO SEAF. Hell Mater	7/18/84, Nancu Stein	-1 -L (W	3908	
REPORT I	ATTEN	CLIENT COMPANY FACILITY	41 X8G1	TAKEN	TYPE P. 0. #	INC. #	н-95

Analytical Serv TEST CODES and NAMES used on this report m625 A method 625 Acid Compounds
M625 B Method 625 Base/Neutrals
M5 624 EPA Method 624/9C-M5

SAMPLE IDENTIFICATION

02 68 03 66 04 76

PAGE 2 RECEIVED: 07/23/84

SAMPLE ID 6A

Analytical Serv REPORT Results by Sample

LAB # 84-07-131

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FRACTION 01A TEST CODE M625 A NAME Method 625 Acid Compounds
Date & Time Collected 07/18/84 Category

BY LAK	RESULT	9	QV.	ON .	Z	S
COMPOUNDS DETECTED BY LAK	COMPOUND	4-nitrophenol	2, 4-dinitrophenol	2-methyl-4,6-dinitrophenol	pentachlorophenol	phenol
ANAL YST TRUMENT	EPA	SBA	59A	60A	64A	65 A
ANALYST INSTRUMENT	SCAN					
led	NPDES SCAN	7.A	e A	4	9 A	10A
07/25/84	RESULT	GN	Q	Q	Q	Q
DATE EXTRACTED <u>07/25/84</u> DATE INJECTED <u>07/30/84</u>	COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenol	2, 4-dimethylphenol
DATA FILE <u>2CU07131C01</u> IC. FACTOR						
의 K	EPA	21A	22A	24A	314	94A
FACTO	SCAN					
DATA FILE CONC. FACTOR	NPDES SCAN	11A	88 •	. O.	8	e A
J	~		t	I-96		

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

2-nitrophenol

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ug/L unless otherwise specified. All results reported

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

PAGE 3 RECEIVED: 07/23/84

Analytical Serv REPORT Results by Sample

LAB # 84-07-131

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NAME Method 625 Base/Neutrals	Category
TEST CODE M625 B	Collected 07/18/84
FRACTION 01A	4
ID 6A	
SAMPLE	

B NAME Method 623 Base/Neutrals Category	BMS VERIFIED BY LAK COMPOUNDS DETECTED Q	COMPOUND	N-nitrosodimethylamine ND	N-nitrosodiphenylamine ND	N-nitrosodi-n-propylamine ND	bis(2-ethylheryl)phthalate ND	butyl benzyl phthalate ND	di-butyl phthalate ND	di-n-octyl phthalate ND	diethyl phthalate ND	dimethyl phthalate ND	benzo(a)anthracene A ND	benzo(a)pyrene ND	benzo(b)fluoranthene * ND	benzo(k)fluoranthene * ND	chrysene A ND	acenaphthylene ND	anthracene B ND	
LESI CUDE M625 B ected 07/18/84	ANALYST	ES SCAN EPA	41B 61B	43B 62B	42B 63B	13B 66B	15B 67B	26B 68B	29B 69B	24B 70B	258 718	5B 72B	4B 73B	7B 74B	98 758	188 768	2B 77B	38 788	
FRACILUN OIA LESI Date & Time Collected	07/25/84 07/30/84	RESULT NPDES	QN	QN	Q.	Q	R	Q	Q	Q	Q	S.	2	2	2	Q	QN	Q	
FRACI	1 DATE EXTRACTED DATE INJECTED	COMPOUND	acenaphthene	benzidine	1,2,4-trichlorobenzene	hexachlorobenzene	hexachloroethane	bis(2-chloroethyl)ether	2-chloronaphthalene	1,2-dichlorobenzene	1,3-dichlorobenzene	1, 4-dichlorobenzene	3,3'dichlorobenzidine	2, 4-dinitrotoluene	2, 6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene	ophenyl phenyl ether	
P 64	DATA FILE <u>2CU07131C01</u>	SCAN EPA	18	88	8B 1,7	9.8	128	18B bis	208	258	268	278	288 3	358	368	378 1	398	40B 4-chlorophenyl	
SAMPLE 10 6A	DATA CONC. FA	NPDES SC	18	48	46B	338	368	81 -9	7 7	20B	218	22B	238	27B	288	298	318	17B	

NAME Method 625 Base/Neutrals Continued From Above benzc'ghi}perylene fluorene phenanthrene B dibenzo(a, h) anthracene pyrene indeno(1, 2, 3-cd)pyrene LAB # 84-07-131 Category FRACTION OIA TEST CODE M625 B Date & Time Collected 07/18/84 79B 808 818 82B 838 84B REPORT Results by Sample 88 32B 44B 198 378 45B 2 2 밁 9 모 밀 2 Analytical Serv 4-bromophenyl phenyl ether NOTES AND DEFINITIONS FOR THIS REPORT. nzene 42B bis(2-chloroisopropyl)ether isophorone bis (2-chloroethoxy) methane hexach lorobutadiene hexachlorocyclopentadiene naphthalene RECEIVED: 07/23/84 43B 41B **338** 52B **54B 55B** SAMPLE 1D 6A 14B 12B 10B 34B 35B 39B 388

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SCAN = scan number or retention time on chromatogram

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All results reported in <u>ug/L</u> unless otherwise specified.

ND = not detacted at EPA detection limit method 6.25, (Federal Register, 11/26/84).

* = benzo(b)fluoranthene and benzo(k)fluoranthene co-elute

A = benzo(a)anthracene and chrysene co-elute in high concentrations

B = anthracens and phenanthrene co-elute in high concentrations.

LAB # 84-07-131

REPORT

Analytical Serv

NAME EPA Method 624/GC-MS Category COMPOUND BMB TEST CODE MS 624 Date & Time Collected 07/18/84 336 46< EPA 320 380 44 450 47 ANALYST INSTRUMENT NPDES SCAN Results by Sample 17 180 224 214 200 184 19 **%** DATE INJECTED 07/25/84 呈 2 웆 9 밀 FRACTION 01B RESULT 9 皇 acrolein chlorobenzene acrylonitrile benzene carbon tetrachloride 1, 1, 1-trichloroethane 1, 1-dichloroethane 1, 2-dichloroethane COMPOUND DATA FILE 4CU07131V01 RECEIVED: 07/23/84 EPA <u>გ</u> 110 13 **4** 5 10 3 ₹ SAMPLE 1D 6A NPDES SCAN 2 2 <u>გ</u> 277 15< 3 H-99

문 Ÿ VERIFIED BY LAK RESULT COMPOUNDS DETECTED methylene chloride methyl bromide bromoform tolvene trichloroethylene vinyl chloride 1, 2-dichloropropane 33V trans-1, 3-dichloropropylene methyl chloride dichlorobromomethane trichlorofluoromethane dichlorodifluoromethane chlorodibromomethane tetrach loroethy lene cis-1, 3-dichloropropylene ethy lbenzene 487 497 200 510 850 798 87∨ 288 313 295 310 124 300 136 8 242 250 윋 물 S 문 S 皇 chloroform 1, 2-trans-dichloroethylene chloroethane 2-chloroethylvinyl ether 1, 1-dichloroethylene 1, 1, 2-trichloroethane 1, 1, 2, 2-tetrachloroethane bis (chloromethyl) ether 30¢ 135 17 19 23< 140 160 292 747 287 234 100 110 160 367 \$ \$

PAGE 6 RECEIVED: 07/23/84

Analytical Serv REPORT Results by Sample

LAB # 84-07-131 Continued From Above

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SAMPLE ID 6A

FRACTION OIB TEST CODE MS 624
Date & Time Collected 07/18/84

NAME EPA Method 624/GC-MS Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in $\frac{\log L}{\log \log n}$ unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

RECEIVED: 07/23/84

SAMPLE ID 68

Analytical Serv REPORT Results by Sample

NAME Method 625 Acid Compounds Category

LAB # 84-07-131

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FRACTION 02A TEST CODE M625 A
Date & Time Collected 07/18/84

COMPOUNDS DETECTED BY LAK	COMPOUND RESULT	4-nitrophenol ND	2, 4-dinitrophenol ND	2-methyl-4,6-dinitrophenol ND	pentachlorophenol ND	pheno! ND	
ANALYST INSTRUMENT	AN EPA	58A	59A	60A	64A	65A	
INSI	NPDES SCAN	7.8	S.A.	4	98	104	
07/25/84 07/30/84	RESULT N	QN	Q	Q	QN	QN	Q.
DATE EXTRACTED DATE INJECTED	COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2, 4-dichlorophenol	2,4-dimethylphenol	2-nitrophenol
DATA FILE <u>2CUO7131CO2</u> IC. FACTOR	EPA	21A 2,4	22A 4-ch]	24A	31A	34A	57A
DATA FILE SCONC. FACTOR		Ŋ	Š	72	ë	ř	'n
DA1	NPDES SCAN	114	8	₩-1	V 01	AE.	6A

NOTES AND DEFINITIONS FOR THIS REPORT.

ug/L unless otherwise specified. SCAN = scan number or retention time on chromatogram. All results reported in

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

NAME Method 625 Base/Neutrals COMPOUNDS DETECTED VERIFIED BY N-nitrosodimethylamine N-nitrosodiphenylamine N-nitrosodi-n-propylamine bis(2-ethylhexyl)phthalate butyl benzyl phthalate di-butyl phthalate di-n-octyl phthalate diethyl phthalate dimethyl phthalate benzo(a)pyrene acenaphthylene œ benzo(a)anthracene benzo(k)fluoranthene benzo(b)fluoranthene chrysene anthracene Category COMPOUND BMS FRACTION OZA TEST CODE M625 B Date & Time Collected 07/18/84 61B 63B ANALYST INSTRUMENT EPA 62B 66B 67B **688** 71B 73B 74B 75B 76B 77B 788 **69**B 70B 72B NPDES SCAN Results by Sample 41B 43B 42B 13B 158 26B 29B 24B 25B 188 2B **6B** 78 38 DATE EXTRACTED 07/25/84 DATE INJECTED 07/30/84 FRACTION OZA 8 皇 ĝ RESULT 2 皇 뮏 9 S 밁 2 2 acenaph thene 1, 2, 4-trichlorobenzene benzidine hexach lorobenzene 1, 3-dichlorobenzene 3, 3'dichlorobenzidine hexachloroethane bis(2-chloroethyl)ether 2-chloronaphthalene 1,2-dichlorobenzene 1, 4-dichlorobenzene 2, 4-dinitrotoluene 2, 6-dinitrotoluene 1,2-diphenylhydrazine fluoranthene 40B 4-chlorophenyl phenyl ether COMPOUND DATA FILE 2CU07131C02 RECEIVED: 07/23/84 EPA 12B 18B 25B 26B 28B 37B **SB** 98 20B 27B 36B 39B 88 35B SAMPLE ID 68 CONC. FACTOR NPDES SCAN 18 46B 36B 11B #-102 33B 20B 21B 22B 23B 27B 28B 29B 318 17B 48

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LAB # 84-07-131

REPORT

Analytical Serv

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RESULT

NAME Method 625 Base/Neutrals Category fluorene phenanthrene B dibenzo(a, h)anthracene benzo(ghi}perylene indeno(1,2,3-cd)pyrene pyrene FRACTION OZA TEST CODE M625 B Date & Time Collected 07/18/84 **79B** 838 808 818 82B 848 All results reported in <u>ug/L</u> unless otherwise specified SCAN = scan number or retention time on chromatogram 88 32B 45B 44B 198 37B S 4-bromophenyl phenyl ether ND NOTES AND DEFINITIONS FOR THIS REPORT niene
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CONTROL
42B bis(2-chloroisopropyl)ether naphthalene bis (2-chloroethoxy) methane hexach lorobutadiene hexachlorocyclopentadiene isophorone 41B 43B **S3B** 54B 52B 55B SAMPLE ID 68 14B 388 12B 108 34B 35B 39B

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Continued From Above

serv Results by Sample

Analytical Serv

RECEIVED: 07/23/84

LAB # 84-07-131

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= benzo(a)anthracene and chrysene co-elute in high concentrations.

* = benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

* anthracene and phenanthrene co-elute in high concentrations

PAGE 10 RECEIVED: 07/23/84

Analytical Serv REPORT Results by Sample

LAB # 84-07-131

	¥ C	RESULT	9	Ş	Q	Š	Š	9	S	Š	S	9	S	9	Q	<u>Q</u>	134	9
EPA Method 624/GC-MS Category	VERIFIED BY COMPOUNDS DETECTED.	COMPOUND	1, 2-dichloropropane	3-dichloropropylene	3-dichloropropylene	ethylbenzene	methylene chloride	methyl chloride	methyl bromide	bromoform	dichlorobromomethane	trichlorofluoromethane	dichlorodifluoromethane	chlorodibromomethane	tetrachloroethylene	toluene	trichloroethylene	vingl chloride
624 NAME	BWS f 4			cis-1,	trans-1,						•	t 7 %	dich	J				
MS 6,	ANALYST TRUMENT	EPA	327	336	334	386	44	450	467	474	480	490	200	510	>5 8 2 2	867	970	88
TEST CODE ected 07/1	ANALYST INSTRUMENT	SSCAN	**	~,	***	**	~	**	***	**	~	**	~	**	5-	~	316	5
TEC	اشد	NPDES	174	180	184	190	224	210	200	š	120	≯ 0€	130	>B	240	250	>6≥	316
FRACTION O2B TEST CODE MS 6 Date & Time Collected 07/18/84	07/25/84	RESULT	QN	QN	QN	QN	Q	QN	QN	QN	QN	QN	QN	Q	Q	Q	S	48
FRACTI Date &	22 DATE INJECTED	COMPOUND	acrolein	acrylonitrile	penzene	carbon tetrachloride	chlorobenzene	1,2-dichloroethane	1, 1, 1-trichloroethane	1,1-dichloroethane	1, 1, 2-trichloroethane	1, 1, 2, 2-tetrachloroethane	chloroethane	bis (chloromethyl) ether	2-chloroethylvinyl ether	chloroform	1,1-dichloroethylene	1,2-trans-dichloroethylene
	4CU07131V02																	
68		EPA	2	> e	4	79	2	100	110	130	140	150	16V	170	190	234	290	70E 1
2	DATA FILE IC. FACTOR	SCAN																214
SAMPLE ID 68	DA.	NPDES	>1	2	ě	>9	2	ት ዘ−10	22 4	140	287	230	%	4	100	110	16V	267

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Analytical Serv Results by Sample

LAB # 84-07-131 Continued From Above

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SAMPLE 1D 68

FRACTION O2B TEST CODE MS 624
Date & Time Collected 07/18/84

NAME EPA Method 624/GC-MS Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in <u>ug/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

Serv Results by Sample Analytical Serv

LAB # 84-07-131

RECEIVED: 07/23/84

SAMPLE ID 6C

NAME Method 625 Acid Compounds FRACTION 03A TEST CODE M625 A
Date & Time Collected 07/18/84

Category

BMB INSTRUMENT DATE EXTRACTED 07/25/84 DATE INJECTED 07/30/84 DATA FILE 20007131003 CONC. FACTOR

VERIFIED BY LAK COMPOUNDS DETECTED

RESULT	2	Q	ND	Q	Q	
COMPOUND	4-nitrophenol	2, 4-dinitrophenol	2-methyl-4,6-dinitrophenol	pentachlorophenol	phenol	
EPA	58A	59A	60A	64A	65A	
NPDES SCAN	7 A	¥ in	4 4	8	10A	~
RESULT	ND	ND	QN	ON	QN	ON
COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2-nitrophenol
EPA	21A	22A	244	314	344	57A
NPDES SCAN	114	88 A8	H- ₹	₹ ∾ -106	9 A	6 A

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

ug/L unless otherwise specified. All results reported in

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

PAGE 13 RECEIVED: 07/23/84

CONTRACTION

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LAB # 84-07-131

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NAME Method 625 Base/Neutrals Continued From Above dibenzo(a, h)anthracene benzo(ghi)perylene phenanthrene B indeno(1,2,3-cd)pyrene LAB # 84-07-131 Category FRACTION 03A TEST CODE M625 B Date & Time Collected 07/18/84 81B 82B 83B 84B 79B BOB REPORT Results by Sample 88 32B 198 378 45B 44B 윋 Analytical Serv 41B 4-bromophenyl phenyl ether 42B bis(2-chloroisopropyl)ether hexachlorocyclopentadiene isophorone naphthalene bis(2-chloroethoxy)methane hexachlorobutadiene RECEIVED: 07/23/84 43B **23B** 54B 55B 52B SAMPLE 10 6C 14B 12B 108 34B 35B 388 39B

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皇 NOTES AND DEFINITIONS FOR THIS REPORT, niene All results reported in <u>ug/L</u> unless otherwise specified

SCAN = scan number or retention time on chromatogram

ND=not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

= benzo(b)fluoranthene and benzo(k)fluoranthene co-elute

= benzo(a)anthracene and chrysene co-elute in high concentrations

= anthracene and phenanthrene co-elute in high concentrations

VERIFIED BY LAK 2 윋 윋 뮏 밁 물 皇 밀 밀 밀 9 윋 뮏 RESULT COMPOUNDS DETECTED NAME EPA Method 624/GC-MS bromoform vinyl chloride 1, 2-dichloropropane cis-1, 3-dichloropropylene 33V trans-1, 3-dichloropropylene ethylbenzene methylene chloride methyl chloride methyl bromide dichlorobromomethane trich lorofluoromethane dichlorodifluoromethane ch lorodibromomethane tetrachloroethylene toluene trich loroethy lene Category COMPOUND BMB TEST CODE MS 624 Date & Time Collected 07/18/84 EPA 320 398 380 440 **46**C 200 216 INSTRUMENT 450 477 480 490 830 860 874 880 ANALYST NPDES SCAN Results by Sample 310 17 18 184 19 224 215 200 この 12< 2< <u>გ</u> 134 8 247 ひのく となり DATE INJECTED 07/25/84 FRACTION 03B 9 皇 윋 Ŝ 旲 2 뮏 9 밀 g 일 RESULT 皇 Ż 윋 뫼 旲 acrolein acrylonitrile carbon tetrachloride chloroform 1, 2-trans-dichloroethylene benzene chlorobenzene 1, 1, 1-trichloroethane 1, 1, 2-trichloroethane 1, 1, 2, 2-tetrachloroethane chloroethane 2-chloroethylvinyl ether 1, 1-dichlorosthylene 1, 2-dichloroethane 1, 1-dichloroethane bis (chloromethyl) ether COMPOUND DATA FILE 4CU07131V03 RECEIVED: 07/23/84 EPA **2**6 110 136 140 13 167 177 300 გ \$ 3 ? 198 23 29 ລຸ CONC. FACTOR SAMPLE 10 6C NPDES SCAN 2 2 გ გ **3** ? 150 145 284 234 \$ \$ 200 117 167 260 27 H-109

LAB # 84-07-131

REPORT

Analytical Serv

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PAGE 16 RECEIVED: 07/23/84

Analytical Serv Results by Sample

LAB # 84-07-131 Continued From Above

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SAMPLE ID 6C

FRACTION 03B TEST CODE MS 624
Date & Time Collected 07/18/84

NAME EPA Method 624/GC-MS Category

NOTES AND DEFINITIONS FOR THIS REPORT.

ug/L unless otherwise specified. = scan number or retention time on chromatogram.

ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79). All results reported in

RECEIVED: 07/23/84

Results by Sample Analytical Serv

REPORT

LAB # 84-07-131

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FRACTION 04A TEST CODE M625 A
Date & Time Collected 07/18/84

NAME Method 625 Acid Compounds Category

SAMPLE 1D 76

DATA FILE 2CU07131CO4 CONC. FACTOR

DATE EXTRACTED 07/25/84 DATE INJECTED 07/30/84

ANAL YST INSTRUMENT

BMS

COMPOUNDS DETECTED

2-chlorophenol 2, 4, 6-trichlorophenol 4-chloro-3-methylphenol 2, 4-dichlorophenol COMPOUND EPA 21A **22A 31A** 24A NPDES SCAN 114 8 S H-111

NPDES SCAN RESULT

S

EPA 7A

584

59A

SA A

2

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4-nitrophenol

2, 4-dinitrophenol

RESULT

COMPOUND

2-methyl-4, 6-dinitrophenol 60A

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S

pentachlorophenol

64A

4

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63A

10A

9

2, 4-dimethylphenol

34A

40

37A

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2

2-nitrophenol

9

phenol

AND DEFINITIONS FOR THIS REPORT.

NOTES

SCAN = scan number or retention time on chromatogram.

ug/L unless otherwise specified All results reported in

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

LAB # 84-07-131 REPORT Results by Sample Analytical Serv RECEIVED: 07/23/84

A S 윋 밁 Ž ᄝ 9 2 문 S 9 ÿ 2 RESULT NAME Method 625 Base/Neutrals COMPOUNDS DETECTED VERIFIED BY bis(2-ethylhexyl)phthalate butyl benzyl phthalate di-n-octyl phthalate diethyl phthalate dimethyl phthalate benzo(a)pyrene acenaphthylene N-nitrosodimethylamine N-nitrosodiphenylamine N-nitrosodi-n-propylamine di-butyl phthalate anthracene benzo(a)anthracene benzo(b)fluoranthene benzo(k)fluoranthene chrysene Category COMPOUND BMS FRACTION 04A TEST CODE M625 B Date & Time Collected 07/18/84 ANALYST INSTRUMENT 66B 63B 74B 75B 76B 77B 61B 67B **70B** 71B 72B 73B 788 EPA 62B **889 869** NPDES SCAN 38 S 41B 13B 29B 24B 25B 18B 43B 42B 15B 26B 38 **6B** 78 DATE EXTRACTED 07/25/84 DATE INJECTED 07/30/84 RESULT 2 일 2 N 2 S 2 9 9 2 ş 일 Ŝ acenaphthene benzidine 1, 2, 4-trichlorobenzene hexachlorobenzene hexachloroethane 2-chloronaphthalene 1, 2-dichlorobenzene 1, 3-dichlorobenzene 1, 4-dichlorobenzene 3, 3 'dichlorobenzidine 2, 4-dinitrotoluene 2,6-dinitrotoluene 1, 2-diphenylhydrazine fluoranthene 40B 4-chlorophenyl phenyl ether bis(2-chloroethyl)ether COMPOUND DATA FILE 20007131004 EPA 12B 25B 26B 27B 28B 358 36B 37B 39B **8 SB** 88 98 18B 20B SAMPLE 10 76 NPDES SCAN 21B 27B **28B** 29B 17B 46B 33B 36B 11B 16B 20B 22B 23B 31B H-112

PAGE 19 RECEIVE	PAGE 19 RECEIVED: 07/23/84	/84	Analytical Serv Resu	Serv Results by Sample	REPORT Sample	2	LAB # 84-07-131 Continued From Above	
SAMPLE 10 76	97 qi		FRACTI Date &	FRACTION <u>04A</u> Date & Time Co	TEST CALLEGE	FRACTION 04A TEST CODE M625 B Date & Time Collected 07/18/84	NAME Method 625 Base/Neutrals Category	5
148	418	4-bromophenyl phen	phenyl ether	QN	88	798	benzo(ghi)perylene NE	2
128	42B	bis(2-chloroisopropyl)ether	opropyl)ether	Q	328	808	fluorene	열
108	438		bis(2-chloroethoxy)methane	Q	448	818	phenanthrene B NC	2
0. 84.	52B	hexachlorob	lorobutadiene	Q	198	828	dibenzo(a,h)anthracene NE	9
358	33B	hexachlorocyclope	clopentadiene	QN	378	838	indeno(1, 2, 3-cd)pyrene NE	윋
386	548		isophorone	QN	45B	848	purene NE	2
398	558		naphthalene	CN				
NOTES AND		DEFINITIONS FOR THIS	REPORT. nzene	QN				
ம் H−11:	CAN = Sc	SCAN = scan number or retenti	tention time on chromatogram	n chroma	togram.			
	11 resul	All results reported in	us/L unless otherwise specified.	otherwi	se speci	₽ied.		

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SECTION STORY

A=benzo(a)anthracene and chrysene co-elute in high concentrations.

* = benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

B = anthracene and phenanthrene co-elute in high concentrations

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Analytical Serv REPORT Results by Sample

LAB # 84-07-131

	¥ o	RESULT	Š	Š	Q	2	ᄝ	9	S	S	8	QV.	S	9	2	S	2	S
SH-JO	IFIED BY DETECTED	RE	ane	919	ene	ene	ide	ide	ide	ora	ane	ane	ane	ane	ene	ene -	ene	ide
EPA Method 624/GC-MS Category	ne.		1, 2-dichloropropane	cis-1,3-dichloropropylene	trans-1,3-dichloropropylene	thylbenzene	chloride	chloride	1 bromide	bromoform	dichlorobromomethane	trichlorofluoromethane	dichlorodifluoromethane	chlorodibromomethane	tetrachloroethylene	toluene	trichloroethylene	chloride
Method 62 Category	VEI COMPOUNDS	COMPOUND	dichlo	chloro	chloro	• th	methylene	methy 1	methy 1		orobro	rofiuo	difluo	odibro	ach lor		ichlor	vinyl
NAME EPA	BENS 4	E 00	1, 2-	1, 3-di	1, 3-di		ae t				dichl	richlo	chloro	ch lor	tetr		t T	
624 NAI	£4			n : s	trans-							ħ	i G					
£ %	ANALYST TRUMENT	EPA	320	336	>ee	386	44	4 50	460	470	48 \	490	200	510	958	867	876	880
	ANALYST INSTRUMENT	SCAN	•	_		•••	••	•		•	_	_	•	_	.	_	_	_
ION 04B TEST (& Time Collected	et i	NPDES	170	187	180	761	224	210	50¢	> n	124	^0E	134	} 8	244	250	762	316
4 a	3/8	۳	9	2	9	일	일	S	9	9	2	9	9	9		S	9	N C
ON THE	07/25/84	RESULT		2	2	2	2	Z	2	2	Z	Z	Z	Z	8	2	2	2
FRACTION 04B Date & Time		RESU		5		•								ether N	ether N			
			acrolein	itrile	benzene N	loride			ethane		ethane	ethane	ethane	ether	ether	chloroform N		
	DATE INJECTED 07/2			5		tetrachloride	chlorobenzene N		ethane		ethane	ethane		ether	ether	roform		
	DATE INJECTED	COMPOUND		itrile		loride		1,2-dichloroethane N		1, 1-dichloroethane N		ethane	ethane	ether	ether	roform	1, 1-dichloroethylene N	
	DATE INJECTED			itrile		tetrachloride			1, 1, 1-trichloroethane	1, 1-dichloroethane	ethane	1, 1, 2, 2-tetrachloroethane	chloroethane	bis (chloromethyl) ether		roform	1, 1-dichloroethylene	1,2-trans-dichloroethylene
FRACT	4CU07131V04 DATE INJECTED	EPA COMPOUND		itrile		tetrachloride			ethane		ethane	ethane	ethane	ether	ether	roform		
	DATE INJECTED	COMPOUND	acrolein	acrylonitrile	benzene	carbon tetrachloride	chlorobenzene	1, 2-dichloroethane	1, 1, 1-trichloroethane	1, 1-dichloroethane	1, 1, 2-trichloroethane	1, 1, 2, 2-tetrachloroethane	chloroethane	bis (chloromethyl) ether	2-chloroethylvinyl ether	chloroform	1, 1-dichloroethylene	1,2-trans-dichloroethylene

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Analytical Serv REPORT Results by Sample

LAB # 84-07-131 Continued From Above

SAMPLE 1D 76

FRACTION 04B TEST CODE MS 624
Date & Time Collected 07/18/84

NAME EPA Method 624/GC-MS Category

NOTES

SCAN = scan number or retention time on chromatogram AND DEFINITIONS FOR THIS REPORT.

All results reported in <u>ug/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

Analytical Serv NonReported Work

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FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

DUP 624 DUP 624 DUP 624 DUP 624 01C 02C 03C 04C

specific matrix was not within acceptable limits indicating * Indicates a value less than 5 times the detection limit. CONTACT CONDVER @ Indicates that spike recovery for this analysis on the second column confirmation performed on samples 2A, 6C, 6D, 6G, 7F ERTIFIED BY Analytical Serv TEST CODES and NAMES used on this report Potential error for such low values ranges between PREPARED <u>Radian Analutical Services</u> BY <u>8501 MoPac Blvd.</u> Footnotes and Comments Duplicate of report of 08/16/84 Austin, Texas 78766 (512) 454-4797 Box 9948 2A, 6C, 6D, 6G, an interferent present ٥ 50 and 100% PHONE ATTEN No te: SAMPLES monitor wells, 601 SAMPLE IDENTIFICATION William Little 212-027-21-05 Tinker AFB REPORT Radian TO Bl. 4 Austin TINKER Fed Ex CL IENT COMPANY TRANS JORK ID ATTEN TAKEN FACILITY . N ≤ . 잉 얾 녱 H-118

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LAB # 84-08-003

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Serv REPORT Results by Sample Analytical Serv

LAB # 84-08-003

NAME EPA Method 601/GC Category Date & Time Collected not specified TEST CODE GC 601 FRACTION OIA SAMPLE 1D 2A

S 8 22.5 Trichloroethene 61.0 RESULT VERIFIED BY COMPOUNDS DETECTED Bromoform 2-Chloroethylvinyl Ether Chlorobenzene 1, 2-Dichlorobenzene 1, 4-Dichlorobenzene 1, 3-Dichlorobenzene Dibromochloromethane 1, 1, 2-Trichloroethane cis-1, 3-Dichloropropene 1, 1, 2, 2-Tetrachloroethane Tetrachloroethylene COMPOUND ACL ANAL YST INSTRUMENT SCAN DATE INJECTED 08/08/84 밁 12.2 일 29.9 2 일 ල ල 일 0.6 9 9 욷 밀 밀 RESULT 11.5 Chloromethane Methylene Chloride Vinyl Chloride Chloroethane Trichlorofluoromethane Chloraform 1,2-Dichloroethane trans-1, 3-Dichloropropene Bromomethane trans-1, 2-Dichloroethene 1, 1, 1-Trichloroethane Bromodichloromethane 1,2-Dichloropropane 1, 1-Dichloroethene 1, 1-Dichloroethane Carbon Tetrachloride COMPOUND DATA FILE CONC. FACTOR SCAN H-119

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serv Results by Sample Analytical Serv

LAB # 84-08-003 Continued From Above

SAMPLE ID 2A

FRACTION OIA TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). ug/L unless otherwise specified. SCAN = scan number or retention time on chromatogram. All results reported in

#1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute.

RESULT VERIFIED BY COMPOUNDS DETECTED Trichloroethene Bromoform 2-Chloroethylvinyl Ether 1, 3-Dichlorobenzene 1, 2-Dichlorobenzene 1, 4-Dichlorobenzene Chlorobenzene NAME EPA Method 601/60 1, 1, 2-Trichloroethane 1, 1, 2, 2-Tetrachloroethane Tetrachloroethylene Dibromochloromethane cis-1, 3-Dichloropropene Category COMPOUND AC L FRACTION 02A TEST CODE GC 601 N Date & Time Collected not specified ANALYST INSTRUMENT SCAN Results by Sample DATE INJECTED 08/08/84 웆 ĝ 2 S S 문 0 2 밀 밁 밁 밀 RESULT Chloromethane Chloroform Bromomethane Vinyl Chloride Methylene Chloride 1,2-Dichloroethane trans-1,3-Dichloropropene Chloroethane **Trichlorofluoromethane** 1, 1-Dichloroethene 1, 1-Dichloroethane trans-1, 2-Dichloroethene 1, 1, 1-Trichloroethane Carbon Tetrachloride **Bromodichloromethane** 1, 2-Dichloropropane COMPOUND RECEIVED: 08/01/84 SAMPLE 1D 6C DATA FILE CONC. FACTOR SCAN H-121

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LAB # 84-08-003

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Analytical Serv REPORT Results by Sample

LAB # 84-08-003 Continued From Above

SAMPLE 10 6C

FRACTION 02A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute ug/L unless otherwise specified. SCAN = scan number or retention time on chromatogram. All results reported in_

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PAGE 6 RECEIVE	PAGE 6 RECEIVED: 08/01/84		Analytical Serv Resu	Serv Results by Sample	REPORT Sample		LA	LAB # 84-08-003	
SAMPLE	SAMPLE ID 60		FRACT	FRACTION 03A Date & Time Col	FRACTION O3A TEST CODE GC 601 Date & Time Collected not specif	GC 601 N	NAME	NAME EPA Method 601/GC	
DA1 CONC.	DATA FILE	80	DATE INJECTED	08/08/84	ANALYST INSTRUMENT	YST	300	IF IED DETECT	BY JSG ED 4
	SCAN	COMPOUND	GND	RESULT	SCAN		5	COMPOUND	RESULT
			Chloromethane	S.				Trichloroethene_	9
			Bromomethane	Q			Dibromo	Dibromochloromethane *	Q
	1	>	Vingl Chloride	Q		•	I, 1, 2-Tr	1,1,2-Trichloroethane * _	S
			Chloroethane	2		Cis	i-1, 3-Di	cis-1,3-Dichloropropene * _	S
		Methy	Methylene Chloride	Q		.,	2-Chlore	2-Chloroethylvinyl Ether _	9
	-	Trichloro	Trichlorofluoromethane	22.0				Bromoform	S
H-12	2	1,1-0	1,1-Dichloroethene	2 0		1, 1,	2, 2-Tetr	1,1,2,2-Tetrachloroethane # _	Q
3	-	1, 1-D	1,1-Dichloroethane	Q			Tetrac	Tetrachloroethylene #_	Q
		trans-1,2-Dichlor)ichloroethene	Q.	m			Chlorobenzene _	21.8
			Chloroform	Q			***	1, 3-Dichlorobenzene	Q
	ļ	1,2-0	1,2-Dichloroethane	Q	4		, i	1,2-Dichlorobenzene	11.0
		1, 1, 1-Trichlor	ichloroethane	Q			7,7	1, 4-Dichlorobenzene	ON
	İ	Carbon Tetrac	Tetrachloride	Q					
	İ	Bromodichloro	chloromethane	Q					
	-	1, 2-Di	1,2-Dichloropropane	9					
	-	trans-1,3-Dichloro	chloropropene	Q					

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Results by Sample Analytical Serv

Continued From Above LAB # 84-08-003

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SAMPLE 1D 6D

FRACTION 03A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute ug/L unless otherwise specified. SCAN = scan number or retention time on chromatogram. All results reported in_

VERIFIED BY COMPOUNDS DETECTED Bromoform Trichloroethene 2-Chloroethylvinyl Ether 1, 3-Dichlorobenzene Chlorobenzene 1, 2-Dichlorobenzene 1, 4-Dichlorobenzene NAME EPA Method 601/GC Dibromochloromethane 1, 1, 2-Trichloroethane 1, 1, 2, 2-Tetrachloroethane **Tetrachloroethylene** cis-1, 3-Dichloropropene Category COMPOUND FRACTION 04A TEST CODE GC 601 N Date & Time Collected not specified ANALYST INSTRUMENT SCAN Results by Sample DATE INJECTED 08/09/84 윋 9 呈 皇 밀 9 욷 윋 윋 g 밀 9 밀 윋 9 9 RESULT Chloromethane **Bromomethane** Vinyl Chloride Chloroethane Methylene Chloride Trichlorofluoromethane 1, 1-Dichloroethene 1, 1-Dichloroethane trans-1, 2-Dichloroethene Chloroform 1, 2-Dichloroethane 1, 1, 1-Trichloroethane Carbon Tetrachloride Bromodich loromethane 1, 2-Dichloropropane trans-1, 3-Dichloropropene COMPOUND RECEIVED: 08/01/84 SAMPLE 10 6E DATA FILE CONC. FACTOR SCAN H-125

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Analytical Serv REPORT Results by Sample

LAB # 84-08-003 Continued From Above

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SAMPLE ID 6E

FRACTION 04A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79) #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. ug/L unless otherwise specified. SCAN = scan number or retention time on chromatogram All results reported in

PAGE 10	CORPORATOR	Analytical Serv	PTV	REPORT	LAB # 84-08-003
RECEIVED: 08/01/84	3/01/84	œ e	Results by Sample	Samp le	
SAMPLE 10 6F		FRACT	FRACTION 05A	TEST CODE GC 601	AME EPA M
		Date	k Time Col	Date & Time Collected not specified	led Category
DATA FILE CONC. FACTOR	4	DATE INJECTED 08/09/84	08/09/84	ANALYST INSTRUMENT	MCL VERIFIED BY JSG b COMPOUNDS DETECTED 2
SCAN	O	COMPOUND	RESULT	SCAN	COMPOUND
-		Chloromethane	QN	Cul	Trichloroethene 0.1
		Bromomethane	QN		Dibromochloromethane * ND
		Vingl Chloride	Q		1, 1, 2-Trichloroethane * ND
		Chloroethane	9		cis-1,3-Dichloropropene * ND
	-	Methylene Chloride	9		2-Chloroethylvinyl Ether ND
H-1	Trich	Trichlorofluoromethane	(n)		Bromoform ND
27	•	1, 1-Dichloroethene	2		1,1,2,2-Tetrachloroethane # ND
1	•	1, 1-Bichloroethane	QN		Tetrachloroethylene # ND
Ì	trans-1	trans-1,2-Dichloroethene	Q		Chlorobeniene ND
		Chloroform	2	1	1, 3-Dichlorobenzene ND
	•	1, 2-Bichloroethane	Q	-	1, 2-Dichlorobenzene ND
	11. 11.	1, 1, 1-Trichloroethane	Q	!	1, 4-Dichlorobenzene ND
	Car	Carbon Tetrachloride	9		
	0100	Bromodichloromethane	Q		
	1,	1, 2-Dichloropropane	Q		
Ì	trans-1,	trans-1, 3-Dichloropropene	GN		

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Analytical Serv REPORT Results by Sample

LAB # 84-08-003 Continued From Above

SAMPLE 10 6F

FRACTION 05A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in $\frac{ug/L}{L}$ unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

0.9 RESULT COMPOUNDS DETECTED VERIFIED BY Trichloroethene 2-Chloroethylvinyl Ether Bromoform Chlorobenzene 1, 3-Dichlorobenzene 1, 2-Dichlorobenzene 1, 4-Dichlorobenzene FRACTION 06A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Dibromoch loromethane cis-1, 3-Dichloropropene 1, 1, 2, 2-Tetrachloroethane 1, 1, 2-Trichloroethane Tetrach loroethylene Category COMPOUND ACL P ANAL YST INSTRUMENT SCAN Serv REPORT Results by Sample DATE INJECTED 08/09/84 ᄝ 밁 9 呈 밁 9 B 9 밁 밁 윋 2 밀 RESULT 9 Chloromethane Vinyl Chloride Chloroethane Chloroform Bromomethane Methylene Chloride Trichlorofluoromethane 1, 1-Dichloroethene 1, 1-Dichloroethane trans-1, 2-Bichloroethene Carbon Tetrachloride 1, 2-Dichloropropane trans-1, 3-Dichloropropene 1, 2-Dichloroethane 1, 1, 1-Trichloroethane Bromodich loromethane COMPOUND SAMPLE ID 66 DATA FILE SCAN H-129

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LAB # 84-08-003

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Analytical Serv REPORT Results by Sample

LAB # 84-08-003 Continued From Above

SAMPLE ID 66

NAME EPA Method 601/GC ad Category FRACTION 06A TEST CODE GC 601 No Date & Time Collected not specified

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

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PAGE 14 RECEIVE	PAGE 14 RECEIVED: 08/01/84		Analytical Serv REPI Results by Sample	rv sults by 9	REPORT Sample		LAB # 84-08-003	
SAMPLE	SAMPLE ID 7A		FRACTI Date &	FRACTION OZA Date & Time Col	FRACTION OZA TEST CODE GC 601 Date & Time Collected not specif	·	NAME EPA Method 601/GC	39.
DAT CONC.	DATA FILE CONC. FACTOR	B DATE	Z	08/09/84	ANALYST	T RGS	VER COMPOUNDS	HETED BY JSG DETECTED 1
	SCAN	COMPOUND		RESULT	SCAN		COMPOUND	RESULT
		Chlo	Chloromethane	Q			Trichloroethene	ene ND
•	-	0.48	Bromomethane	QN	1	Dibr	Dibromochloromethane	W *
•		Vingl	Chloride	QN	-	1,1,2	1, 1, 2-Trichloroethane	# *
•	ļ	Ch1	Chloroethane	QN	1	cis-1,3	cis-1, 3-Dichloropropene	# *
•	ţ	Methylene	Chloride	Q		2-Ch1	2-Chloroethylvinyl Ether	ther ND
н-		Trichlorofluoromethane	romethane	2, 2			Bromoform	orm ND
131		1,1-Dichl	1,1-Dichloroethene	QN		1, 1, 2, 2-1	1, 1, 2, 2-Tetrachloroethane	GN #
٠		1,1-Dichlo	oroethane	QN		Tet	Tetrachloroethylene	WD *
•	1	trans-1,2-Dichloroethene	oroethene	QN			Chlorobenzene	ane ND
•		0	Chloroform	QN	1		1, 3-Dichlorobenzene	ene ND
•	i	1,2-Dichl	1, 2-Dichloroethane	QN			1,2-Dichlorobenzene	ane ND
·		1, 1, 1-Trichlo	oroethane	QN			1,4-Dichlorobenzene	ene ND
·		Carbon Tetrachloride	achloride	QN				
•		Bromodichloromethane	romethane	Q				
		1, 2-Dichloropropane	ropropane	Q				
•		trans-1, 3-Dichloropropene	ropropene	Q				

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Analytical Serv REPORT Results by Sample

LAB # 84-08-003 Continued From Above

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SAMPLE 10 7A

FRACTION 07A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute All results reported in $\frac{19/L}{L}$ unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram

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Ş 옔 RESULT ĝ 皇 Ş 2 2 2 S Ž VERIFIED BY COMPOUNDS DETECTED Bromoform Trichloroethene Chlorobenzene 2-Chloroethylvinyl Ether 1, 3-Dichlorobenzene 1,2-Dichlorobenzene 1, 4-Dichlorobenzene NAME EPA Method 601/60 1, 1, 2, 2-Tetrachloroethane Tetrachloroethylene Dibromoch loromethane 1, 1, 2-Trichloroethane cis-1, 3-Dichloropropene LAB # 84-08-003 Category COMPOUND RGS FRACTION OBA TEST CODE GC 601 NA Date & Time Collected not specified TEST CODE GC 601 ANALYST INSTRUMENT SCAN Serv REPORT Results by Sample DATE INJECTED 08/09/84 S 밁 S 오 皇 일 S S 2 2 9 Z Ž 윋 S S RESULT Analytical Serv Chloroform Chloromethane Methylene Chloride trans-1, 2-Dichloroethene 1, 2-Dichloroethane Carbon Tetrachloride trans-1, 3-Dichloropropene Bromomethane Vinyl Chloride Chloroethane 1, 1-Dichloroethene 1, 1-Dichloroethane 1, 1, 1-Trichloroethane Bromodichloromethane 1,2-Dichloropropane Trichlorofluoromethane COMPOUND RECEIVED: 08/01/84 SAMPLE 10 7C DATA FILE CONC. FACTOR SCAN H-133

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Analytical Serv REPORT Results by Sample

LAB # 84-08-003 Continued From Above

SAMPLE 1D 7C

FRACTION OBA TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79) #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. ug/L unless otherwise specified = scan number or retention time on chromatogram. All results reported in

VERIFIED BY COMPOUNDS DETECTED Trichloroethene Bromoform 2-Chloroethylvinyl Ether Chlorobenzene 1, 3-Dichlorobenzene 1, 2-Dichlorobenzene 1, 4-Dichlorobenzene NAME EPA Method 601/60 Dibromoch loromethane 1, 1, 2-Trichloroethane 1, 1, 2, 2-Tetrachloroethane **Tetrachloroethylene** cis-1, 3-Dichloropropene Category COMPOUND RGS FRACTION 09A TEST CODE GC 601 N Date & Time Collected not specified TEST CODE GC 601 ANALYST INSTRUMENT SCAN DATE INJECTED 08/09/84 윋 S 13.3 일 2 9 9 9 밁 9 RESULT 19.2 Chloromethane Vinyl Chloride Chloroethane Methylene Chloride Chloroform Bromomethane **Trichlorofluoromethane** 1, 1-Dichloroethane 1, 2-Dichloroethane Carbon Tetrachloride 1, 1-Dichloroethene trans-1, 2-Dichloroethene 1, 1, 1-Trichloroethane Bromodichloromethane COMPOUND SAMPLE 10 7F DATA FILE CONC. FACTOR SCAN H-135

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trans-1, 3-Dichloropropene

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1,2-Dichloropropane

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LAB # 84-08-003

Serv REPORT Results by Sample

Analytical Serv

RECEIVED: 08/01/84

Serv REPORT Analytical Serv PAGE 19 RECEIVED: 08/01/84

SAMPLE 10 7F

LAB # 84-08-003 Continued From Above

Constant Research Constant Constant

FRACTION 09A TEST CODE GC 601 NA Date & Time Collected not specified

NAME EPA Method 601/GC Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2—trichloroethane and cis—1,3—dichloropropene co-elute. " not detected at EPA detection limit method 601, (Federal Register, #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute <u>ug/L</u> unless otherwise specified. SCAN = scan number or retention time on chromatogram. All results reported in

CALLED TRANSPORTED CONTRACTOR

Analytical Serv REPORT NonReported Work

PAGE 20 RECEIVED: 08/01/84

CORPORATION

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

DUP 601 DUP 601 DUP 601 DUP 601 DUP 601 DUP 601

018 028 038 048 058 058 078 078 098

H-137

* Indicates a value less than 5 times the detection limit. CONTACT CONDVER LAB # 84-08-013 for such low values ranges between PREPARED Radian Analutical Services Footnotes and Comments Duplicate of report of 08/17/84 Austin, Texas 78766 8501 MoPac Blvd (512) 454-4797 Analytical Serv REPORT 04/26/85 12:06:04 P. O. Box 9948 Potential error 50 and 100% × PHONE ATTEN SAMPLES Monitoring Wells federal express ATTEN William Little 212-027-21-05 Tinker AFB RECEIVED: 08/01/84 REPORT Radian Austin NS/DHG TINKER TRANS MORK ID CL IENT COMPANY TAKEN FACILITY INC

KESSIII EXCEPTOS LOCULOSE CARGOSO

TANDESCA TO PROPERTY

specific matrix was not within acceptable limits indicating e Indicates that spike recovery for this analysis on the an interferent present

SAMPLE IDENTIFICATION

10. 6D

10. 6E

10. 6E

10. 6E

10. 6E

10. 6E

10. 7A

10. 7C

Analytical Serv TEST CODES and NAMES used on this report M625 A method 625 Acid Compounds
M625 B Method 625 Base/Neutrals
M8 624 EPA Method 624/GC-M8

H-138

RECEIVED: 08/01/84

SAMPLE ID 6D

Analytical Serv REPORT Results by Sample

CONTRACTOR CONTRACTOR SOCIETY CONTRACTOR CONTRACTOR

LAB # 84-08-013

FRACTION 01A TEST CODE M625 A
Date & Time Collected 07/31/84

NAME Method 625 Acid Compounds Category

CONC. FACTOR

DATE EXTRACTED 08/01/84
DATE INJECTED 08/06/84

ANAL YST INSTRUMENT

BMS CO

VERIFIED BY LAK COMPOUNDS DETECTED 0

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RESULT

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g

pentachlorophenol 4-nitrophenol 2, 4-dinitrophenol phenol 2-methyl-4,6-dinitrophenol COMPOUND 60A 64A EPA **58A 59A 65A** NPDES SCAN **7**A 10A S V 4 밀 RESULT g Q 2-chlorophenol 2, 4, 6-trichlorophenol 4-chloro-3-methylphenol 2,4-dichlorophenol 2, 4-dimethylphenol 2-nitrophenol COMPOUND 22A 31A **57A** 21A 24A 34A NPDES SCAN 11A 8 4 4 49 H-139

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84). ug/L unless otherwise specified All results reported in

VERIFIED BY LAK 밀 9 皇 RESULT S NAME Method 625 Base/Neutrals COMPOUNDS DETECTED M-nitrosodi-n-propylamine bis(2-ethylhexyl)phthalate butyl benzyl phthalate di-n-octyl phthalate diethyl phthalate N-nitrosodimethylamine N-nitrosodiphenylamine di-butyl phthalate dimethyl phthalate benzo(a)pyrene benzo(a)anthracene benzo(b)fluoranthene LAB # 84-08-013 Category COMPOUND BMS TEST CODE M625 B Date & Time Collected 07/31/84 EPA 63B 66B ANALYST INSTRUMENT 61B 62B **678** 889 **69**B **708** 71B 72B **73B** 74B NPDES SCAN REPORT Results by Sample 418 43B 42B 13B 15E 26B 29B 248 25B 200 730 68 DATE EXTRACTED 08/01/84
DATE INJECTED 08/06/84 RESULT FRACTION OIA 일 g 9 9 일 밁 웆 2 Analytical Serv acenaphthene benzidine 1, 2, 4-trichlorobenzene hexachloroethane 2-chloronaphthalene 1, 2-dichlorobenzene 1, 4-dichlorobenzene hexach lorobenzene 3, 3'dichlorobenzidine 2, 4-dinitrotoluene bis(2-chloroæthyl)æther 1, 3-dichlorobenzene COMPOUND DATA FILE 2CU08013C01 RECEIVED: 08/01/84 EPA 12B 25B 27B 18B 20B 26B 28B 35B 18 38 88 98 SAMPLE ID 6D NPDES SCAN PAGE 3 18 46B 338 36B 1 1B 16B 20B 21B 22B 23B 27B 400

月 Ŷ 밀 뮏 月 물 acenaphthylene chrysene anthracene benzo(k)fluoranthene 75B 76B 778 788 18B 38 93 g 밀 윋 일 1,2-diphenylhydrazine fluoranthene 40B 4-chlorophenyl phenyl ether 2,6-dinitrotoluene **36B** 37B 39B 17B 28B **39B** 318 H-140

REPORT Analutical Serv

LAB # 84-08-013

CONTRACT AND CONTRACT CONTRACTOR SERVICES DEPOSITE CONTRACTOR

RECEIVED: 08/01/84	08/01/	84 Resu	Results by Sample	Sample	;	Continued From Above
SAMPLE ID 60	09		FRACTION OIA TEST CODE M625 Date & Time Collected 07/31/84	TEST CO	TEST CODE M625 B	NAME Method 625 Base/Neutrals Category
148	418	4-bromophenyl phenyl	ether ND	88	79B	benzo(ghi)perylene ND
128	42B	42B bis(2-chloroisopropyl)e	ether ND	328	808	fluorene
108	43B	bis(2-chloroethoxy)me(ethane ND	4 4 8	818	phenanthrene B ND
34B	52B	hexachlorobutad	adiene ND	198	828	dibenzo(a, h)anthracene ND
338	53B	hexachlorocyclopentadiene	iene ND	37B	838	indeno(1,2,3-cd)pyrene ND
388	34B	isapharane	rone ND	45B	848	Dy energy
398	55B	naphthalene	lene ND			
NOTES AND	DEFINI	NOTES AND DEFINITIONS FOR THIS REPORT, nzene	Zene ND			

= scan number or retention time on chromatogram. SCAN ug/L unless otherwise specified. All results reported in

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

* = benzo(b) fluoranthene and benzo(k) fluoranthene co-elute.

= benzo(a)anthracene and chrysene co-elute in high concentrations.

= anthracene and phenanthrene co-elute in high concentrations

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Consolation		D. 10/01/04

LAB # 84-08-013 Halytical Serv REPORT Results by Sample

S	BY LAK	RESULT	8	Q	Q	Ş	ON	9	ON	Q	2	Q	Ÿ	2	CN	QN	ND	ND
NAME EPA Method 624/GC-MS Category	BWS VERIFIED BY	COMPOUND	1,2-dichloropropane	cis-1,3-dichloropropylene	trans-1, 3-dichloropropylene	ethylbenzene .	methylene chloride	methyl chloride	methyl bromide	bromoform	dichlorobromomethane	trichlorofluoromethane	dichlorodifluoromethane	chlorodibromomethane	tetrachloroethylene	toluene	trichloroethylene	vinyl chloride
MS 624 11/84	YST	EPA	320	336	33V tr	380	440	450	467	470	480	490	200	510	ASB	798	870	880
TON OIB TEST CODE MS 624 & Time Collected 07/31/84	ANALYST INSTRUMENT	NPDES SCAN	170	180	187	190	227	217	200	2€	120	300	130	>8	240	250	297	310
FRACTION O18 Date & Time Col	08/02/84	RESULT N	Q	QN	QV	QN	30	GN	Q	QN	QN	Q	Q	Q	QN	Q	Q	Q
FRACTI Date 8	1 DATE INJECTED	COMPOUND	acrolein	acrylonitrile	benzene	carbon tetrachloride	chlorobenzene	1,2-dichloroethane	1, 1, 1-trichloroethane	1,1-dichloroethane	1, 1, 2-trichloroethane	1, 1, 2, 2-tetrachloroethane	chloroethane	bis (chloromethyl) ether	2-chloroethylvinyl ether	chloroform	1, 1-dichloroethylene	1,2-trans-dichloroethylene
	4CU08013V01								7~4		₩	1,1,2		bis	2-ch			
9	의 K	EPA	%	è	\$	>9	?	100	110	130	140	150	167	170	190	230	290	304
	DATA FILE 4C. FACTOR	SCAN					475							,				
SAMPLE ID 60	DA)	NPDES	2	8	ě	9	₹	ි -142	Ÿ.	. 4	280	234	%	4	100	110	16V	267

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Analytical Serv REPORT Results by Sample

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LAB # 84-08-013 Continued From Above

SAMPLE 10 60

FRACTION OIB TEST CODE MS 624
Date & Time Collected 07/31/84

NAME EPA Method 624/GC-MS Category

NOTES

SCAN = scan number or retention time on chromatogram AND DEFINITIONS FOR THIS REPORT.

All results reported in <u>ug/l</u> unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

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SAMPLE 1D 6E

Analytical Serv REPORT Results by Sample

LAB # 84-08-013

: 08/01/84

NAME Method 625 Acid Compounds Category FRACTION 02A TEST CODE M625 A
Date & Time Collected 07/30/84

COMPOUNDS DETECTED VERIFIED BY STA BAS INSTRUMENT DATE EXTRACTED 08/01/84
DATE INJECTED 08/06/84 DATA FILE 2008013002 CONC. FACTOR

RESULT	ON	S	Q	Q	QV	
COMPOUND	4-nitrophenol	2, 4-dinitrophenol	2-methyl-4,6-dinitrophenol	pentachlorophenol	phenol	
EPA	58A	59A	60A	64A	65 A	
NPDES SCAN	7.4	∀	4 4	9 4	104	
RESULT	ON	N	Q	Q	Q	S
COMPOUND	2, 4, 6-trichlorophenal	4-chloro-3-methylphenol	2-chlorophenol	2, 4-dichlorophenol	2, 4-dimethylphenol	2-nitrophenol
EPA	21A	22A	24A	314	34A.	57A
NPDES SCAN	114	æ	H-	& 7	9.4	, 6A

NOTES AND DEFINITIONS FOR THIS REPORT.

ug/L unless otherwise specified. SCAN = scan number or retention time on chromatogram. All results reported in

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

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Analytical Serv REPORT Results by Sample

LAB # 84-08-013

B NAME Method 625 Base/Neutrals	Category
FRACTION 02A TEST CODE M625 B	Date & Time Collected 07/30/84
WPLE ID 6E	

B NAME Method 625 Base/Neutrals Category	BMS VERIFIED BY LAK COMPOUNDS DETECTED O	COMPOUND RESULT	N-nitrosodimethylamine ND	N-nitrosodiphenylamine ND	N-nitrosodi-n-propylamine ND	bis(2-ethylhexyl)phthalate ND	butyl benzyl phthalate ND	di-butyl phthalate ND	di-n-octyl phthalate ND	diethyl phthalate ND	dimethyl phthalate ND	benzo(a)anthracene A ND	benzo(a)pyrene ND	benzo(b)fluoranthene * ND	benzo(k)fluoranthene * ND	chrysene A ND	acenaphthylene ND	anthracene B ND
ION OZA TEST CODE M625 & Time Collected 07/30/84	ANALYSTINSTRUMENT	SCAN EPA	618	829	8£9	668	67B	889	869	70B	718	728	738	748	758	768	77B	788
TEST Liecte		NPDES	418	43B	42B	138	1 SB	26B	298	24B	25B	S S	89	78	6. 83	188	22	8 8
FRACTION <u>O2A</u> Date & Time Co	08/01/84 08/06/84	RESULT	QN	QN	QN	Q	Q	Q	Q	Q	Q	QN	Q	Q	QV	Q	Q	Ö
FRACTI Date 8	DATE EXTRACTED DATE INJECTED	COMPOUND	acenaphthene	benzidine	1,2,4-trichlorobenzene	hexachlorobenzene	hexachloroethane	þis(2-chloroethyl)ether	2-chloronaphthalene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	3,3'dichlorobenzidine	2, 4-dinitrotoluene	2, 6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene	henyi phenyi ether
	08013001				1,2,			þis (2	C)	~~	⊶	-	e 'e			1,2		4-chlorophenyl
10 6E	DATA FILE 2CUOBO13CO1	SCAN EPA	18	SB	88	98	128	18B	20B	258	26B	278	288	358	368	37B	39B	40B
SAMPLE ID 6E	DATA CONC. F	NPDES S	18	4	46B	338	368	817 H-14	168	208	218	22B	23B	278	288	298	318	178

PAGE 9 RECEIVED: 08/01/84	08/01/		Analytical Serv Resu	Serv Results by Sample	REPORT Sample		LAB # 84-08-013 Continued From Above
SAMPLE ID 6E	治		FRACTION OZA Date & Time (Time Co	FRACTION OZA TEST CODE M625 B Date & Time Collected 07/30/84	M625 B /30/84	NAME Method 625 Base/Neutrals Category
# 4B	41B	4-bromophenyl pheny	phenyl ether	QN	88	798	benzo(ghi)perylene NB
12B	42B	bis(2-chloraisopropy	propyl}ether	QN	328	808	fluorene ND
108	43B	bis(2-chloroethoxy)methane	:hoxy}methane_	QN	44B	818	phenanthrene B ND
048	52B	hexachlorobu	orobutadiene _	QN	198	828	dibenzo(a,h)anthracene ND
850	538	hexachlorocyclopen	lopentadiene _	QN	378	838	indeno(1, 2, 3-cd)pyrene ND
88 8	548		isophorone	Q	458	848	Double ND
860	55B		naphthalene_	Q			

SCAN = scan number or retention time on chromatogram

NOTES AND DEFINITIONS FOR THIS REPORT, nzene

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All results reported in <u>ug/L</u> unless otherwise specified.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

= benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

A=benzo(a)anthracene and chrysene co-elute in high concentrations.

= anthracene and phenanthrene co-elute in high concentrations

밀 물 g 밀 Ÿ S 2 일 Ž Ÿ 밀 LAK AK Ÿ ÿ S RESULT 70 COMPOUNDS DETECTED VERIFIED BY NAME EPA Method 624/GC-MS bromoform tetrachloroethylene vinyl chloride 1,2-dichloropropane 33V trans-1, 3-dichloropropylene methylene chloride methyl chloride methyl bromide dichlorodifluoromethane trichloroethylene cis-1, 3-dichloropropylene ethylbenzene dichlorobromomethane trichlorofluoromethane ch lorodibromomethang toluene LAB # 84-08-013 Category COMPOUND BMB TEST CODE MS 624 Date & Time Collected 07/30/84 ANALYST INSTRUMENT 870 288 330 440 764 200 216 830 298 EPA 320 380 450 794 470 480 453 NPDES SCAN REPORT Results by Sample 250 295 316 184 214 202 300 >e= 245 17 180 190 222 3 12 à DATE INJECTED 08/02/84 Ź 말 ĝ S S 욷 S 皇 2 FRACTION 02B RESULT Analytical Serv acrolein 1, 2-trans-dichloroethylene acrylonitrile benzene carbon tetrachloride chlorobenzene 1, 2-dichloroethane 1, 1, 1-trichloroethane 1, 1-dichloroethane 1, 1, 2, 2-tetrachloroethane chloroethane bis (chloromethyl) ether 2-chloroethylvinyl ether chloroform 1, 1-dichloroethylene 1, 1, 2-trichloroethane COMPOUND DATA FILE 4CU0B013V02 RECEIVED: 08/01/84 EPA 17 >0E <u>გ</u> \$ 3 ? 100 110 13 140 150 160 190 234 294 SAMPLE ID 6E NPDES SCAN ລີ 74 234 115 791 267 2 8 3 ₹ 150 2₹ 284 \$ **\$** 100 H-147

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Analytical Serv REPORT Results by Sample PAGE 11 RECEIVED: 08/01/84

LAB # 84-08-013 Continued From Above

SAMPLE 10 6E

FRACTION O2B TEST CODE MS 624
Date & Time Collected 07/30/84

NAME EPA Method 624/GC-MS Category

AND DEFINITIONS FOR THIS REPORT. NOTES

SCAN = scan number or retention time on chromatogram.

All results reported in $\frac{\log/l}{\log}$ unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

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Serv Results by Sample Analytical Serv

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LAB # 84-08-013

SAMPLE ID 6F

NAME Method 625 Acid Compounds FRACTION 03A TEST CODE M625 A
Date & Time Collected 07/30/84

Category

DATE EXTRACTED 08/01/84
DATE INJECTED 08/06/84 CONC. FACTOR

ANALYST INSTRUMENT

VERIFIED BY COMPOUNDS DETECTED

BMS

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RESULT	N	Q	N	Ö	Q Z	
COMPOUND	4-nitrophenol	2, 4-dinitrophenol	2-methyl-4,6-dinitrophenol	pentachlorophenol	phenol	
EPA	58A	59A	60A	64A	63A	
RESULT NPDES SCAN	7A	5A	44	9 A	10A	
RESULT	Q	Q	Q	Q	QN	QN
COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenol	2, 4-dimethylphenol	2-nitrophenol
EPA	21A	22A	24A	314	34A	57A
NPBES SCAN	¥ # #	A8	4	₩-14	₹ 6	6

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified. ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

RESULT NAME Method 625 Base/Neutrals COMPOUNDS DETECTED VERIFIED BY butyl benzyl phthalate di-butyl phthalate N-nitrosodimethylamine N-nitrosodiphenylamine N-nitrosodi-n-propylamine bis(2-ethylhexyl)phthalate di-n-octyl phthalate diethyl phthalate dimethyl phthalate benzo(a)pyrene benzo(a)anthracene benzo(k)fluoranthene benzo(b)fluoranthene LAB # 84-08-013 Category COMPOUND BIMS TEST CODE M625 B Date & Time Collected 07/30/84 EPA 61B 62B **63B 66B** 67B **889** 869 70B 71B 72B 738 74B 75B ANALYST INSTRUMENT NPDES SCAN REPORT Results by Sample 41B 43B 42B 138 158 **26B** 29B 24B 25B S **89** 720 DATE EXTRACTED 08/01/84
DATE INJECTED 08/06/84 밀 밀 S 2 2 g 문 2 皇 皇 2 RESULT ᄝ FRACTION 03A Analytical Serv 2,6-dinitrotoluene acenaphthene benzidine 1, 2, 4-trichlorobenzene hexach lorobenzene hexachloroethane bis(2-chloroethyl)ether 2-chloronaphthalene 1, 2-dichlorobenzene 1, 3-dichlorobenzene 1, 4-dichlorobenzene 3, 3 'dichlorobenzidine 2, 4-dinitrotoluene COMPOUND DATA FILE 2CU0B013C03 CORPORATION 08/01/84 EPA 12B 18B 20B 25B 26B 27B 28B 35B 36B SB 88 98 SAMPLE ID 6F NPDES SCAN RECEIVED: 16B 18 4 B 46B 338 368 11B 20B 21B 223 23B 27B 288

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chrysene

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anthracene

acenaphthylene

77B

2B

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fluoranthene

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4-chlorophenyl phenyl ether

40B

17B

788

76B

188

2

1,2-diphenylhydrazine

37B

39B

39B

318

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Analytical Serv REPORT Results by Sample

LAB # 84-08-013 Continued From Above

SAMPLE ID 6F	19 OF	T	FRACTION 03A		CODE M625 B	TEST CODE M625 B NAME Method 625 Base/Neutrals
		ã	Date & Time Collected 07/30/84	0	07/30/84	Category
148	418	4-bromophenyl phenyl	ether ND	88	798	benzo(ghi)perylene ND
128	42B	bis(2-chloroisopropyl) ether ND	328	808	fluorene ND
108	4 3B	B bis(2-chloroethoxy)methane	ND ene	448	818	phenanthrene B ND
348	528	3 hexachlorobutadiene	QN eue	198	828	dibenzo(a, h)anthracene ND
338	538	3 hexachlorocyclopentadiene	ene ND	378	838	indeno(1,2,3-cd)pyrene ND
388	548	3 isophorone	one ano.	458	848	On susubd
398	558	3 naphthalene	ene ND			
NOTES ,	AND DEFIR	NOTES AND DEFINITIONS FOR THIS REPORT. n.	. nzene ND			

SCAN = scan number or retention time on chromatogram.

All results reported in <u>ug/L</u> unless otherwise specified.

ND = not detected at EPA detection limit method 6.25, (Federal Register, 11/26/84).

= benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

= benzo(a)anthracene and chrysene co-elute in high concentrations.

= anthracene and phenanthrene co-elute in high concentrations.

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Analytical Serv RePURT Results by Sample

LAB # 84-08-013

STATE DESCRIPTION OF STATE OF

NAME EPA Method 624/6C-MS Category FRACTION 03B TEST CODE MS 624
Date & Time Collected 07/30/84 SAMPLE ID 6F

NFIED BY LAK DETECTED O	RESULT	ane ND	ene ND	ene ND	ene ND	ide	ide ND	ide	orm ND	ane ND	ane ND	ane ND	ane ND	ene ND	ane ND	ene ND	i de ND
VERIFIED COMPOUNDS DETEC	COMPOUND	1,2-dichloropropane	3-dichloropropylene	trans-1, 3-dichloropropylen	ethylbenzene	methylene chlorid	methyl chloride	methyl bromid	bromoform	dichlorobromomethane	trichlorofluoromethane	dichlorodifluoromethane	chlorodibromomethane	tetrach loroethy lene	taluene	trichloroethylene	vinyl chloride
BWS f4	U	,i	cis-1, 3-	trans-1,3-		E				dic	trich	dichla	ch 2	ţ			
ANAL YST TRUMENT	EPA	320	334	330	380	4 7	4 50	467	470	480	490	200	510	950	758	970	880
ANAL YST INSTRUMENT	NPDES SCAN	170	187	180	190	227	210	200	>5	127	306	130	>8 >	24V	257	297	310
/84		 Ol	 اد	 ଘା	 Gi	 ଘା	 al	 al		 ଘା	 al	 al	Q	 ଘା	 Al	 일	 의
08/02/84	RESULT	Q	2	Ŷ	S	Ŷ	QN	Q	QN	Q	QN	Q	Z	Q	Q	Z	Z
INJECTED		acrolein	acrylonitrile	benzene	tetrachloride	chlorobenzene	1,2-dichloroethane	loroethane	1, 1-dichloroethane	loroethane	loroethane	chloroethane	thyll ether	ingl ether	chloroform	proethylene	roethylene
<u>703</u> DATE	COMPOUND		# J # C #		carbon tet	ch 1	1, 2-dich	1, 1, 1-trichloroethane	1, 1-dich	1, 1, 2-trichloroethane	1,1,2,2-tetrachloroethane	ű	bis (chloromethyl)	2-chloroethylvinyl		1,1-dichloroet	1,2-trans-dichloroet
4CU08013V03										•	11, 11		φ.	Ϋ́			
	EPA	2	è	4	>9	\$	100	110	130	140	150	167	170	190	230	294	300
DATA FILE CONC. FACTOR	NPBES SCAN	71	ان در	<u>></u>	^9	?	150	270	140	287	230	>6	>4	100	110	16V	26V
Ö	Q Z								-152								-

Analutical Serv	ts by Sar	FRACTION 03B TEST CODE MS 624 Date & Time Collected 07/30/84
	08/01/84	6F
PAGE 16	RECEIVED: 08/01/84	SAMPLE 10 6F

LAB # 84-08-013 Continued From Above

NAME EPA Method 624/GC-MS Category

NOTES

SCAN = scan number or retention time on chromatogram. AND DEFINITIONS FOR THIS REPORT.

All results reported in $\frac{49/1}{1}$ unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

H-153

RECEIVED: 08/01/84 PAGE 17

Serv Results by Sample Analytical Serv

LAB # 84-08-013

THE REPORT OF THE PARTY OF THE

SAMPLE ID 66

FRACTION 04A TEST CODE M625 A
Date & Time Collected 07/30/84

NAME Method 625 Acid Compounds Category

DATA FILE 20008013004 CONC. FACTOR

DATE EXTRACTED 08/01/84
DATE INJECTED 08/06/84

INSTRUMENT

BMS

VERIFIED BY COMPOUNDS DETECTED

Y O

RESULT	9	N	Q	Q	9	
COMPOUND	4-nitrophenol	2, 4-dinitrophenol	2-methyl-4,6-dinitrophenol	pentachlorophenol	phenol	
EPA	58A	59A	60A	64A	65A	
SCAN						
NPDES SCAN	7A	n A	4	94	10A	
RESULT	QN	QN	CN	GN	Q	QN
COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2-nitrophenol
EPA	21A	22A	24A	314	34A	57A
NPDES SCAN	114	BA	14	24	34	6A
		1,4 . 4 1	eri eri	H-1		

AND DEFINITIONS FOR THIS REPORT. NOTES

SCAN = scan number or retention time on chromatogram.

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84). ug/L unless otherwise specified. All results reported in

LAB # 84-08-013 REPORT Results by Sample Analytical Serv RECEIVED: 08/01/84 PAGE 18

¥ O 밀 2 9 Ş Z 9 Ż 물 밀 Ž RESULT NAME Method 625 Base/Neutrals VERIFIED BY COMPOUNDS DETECTED benzo(a)pyrene N-nitrosodimethylamine N-nitrosodi-n-propylamine butyl benzyl phthalate di-butyl phthalate di-n-octyl phthalate diethyl phthalate dimethyl phthalate acenaphthylene N-nitrosodiphenylamine bis(2-ethylhexyl)phthalate benzo(a)anthracene chrysene benzo(b) fluoranthene benzo(k)fluoranthene anthracene Category COMPOUND BMS TEST CODE M625 B Date & Time Collected 07/30/84 ANALYST INSTRUMENT 618 66B 73B 74B 75B 76B 778 62B **63B** 869 71B 72B 78B EPA **67B 68B** 7GB NPDES SCAN 26B 24B 25B 188 300 41B 43B 42B 13B 15B 29B の日 **6B** 200 28 DATE EXTRACTED 08/01/84 DATE INJECTED 08/06/84 RESULT 밁 9 g S S S S 皇 뮏 2 S 일 읖 2 FRACTION 04A ĝ acenaphthene benzidine 1, 2, 4-trichlorobenzene hexach lorobenzene hexachloroethane 2-chloronaphthalene 1, 2-dichlorobenzene 1, 3-dichlorobenzene 1, 4-dichlorobenzene 3, 3'dichlorobenzidine 2, 4-dinitrotoluene 2,6-dinitrotoluene 1, 2-diphenylhydrazine fluoranthene 40B 4-chlorophenyl phenyl ether bis(2-chloroethyl)ether COMPOUND DATA FILE 2008013004 CONC. FACTOR 2 EPA 27B 28B 36B 37B 39B **8** 88 86 12B 188 20B 25B 26B 35B SAMPLE 10 66 NPDES SCAN 46B 36B 16B 20B 218 22B 23B 27B 28B 29B 318 17B ä 48 338 118 H-155

PAGE 19 RECEIVED:	7 ED: 08/01/84	1/84	Analytical Serv Resu	Serv Results by Sample	REPORT Sample		LAB # 84-08-013 Continued From Above
SAMPLE 10 66	99 OI		FRACTION 04A Date & Time	I O4A	FRACTION 04A TEST CODE M625 B Date & Time Collected 07/30/84	E M625 B /30/84	NAME Method 625 Base/Neutrals Category
148	41B	8 4-bromophenyl pheny	nyl phenyl ether	Q	88	79B	benzo(ghi)perylene ND
128	421	428 bis(2-chloroisopropy	oisopropy]}ether _	윙	328	808	fluorene ND
108	43B	B bis(2-chloroethoxy	roethoxy)methane	R	44B	818	phenanthrene B ND
348	52B		hexachlorobutadiene _	Q	198	828	dibenzo(a,h)anthracene ND
358	\$3B	B hexachlorocyclopen	ocyclopentadiene _	S	378	838	indeno(1,2,3-cd)pyrene ND
388	24B	m	isophorone	윙	45B	848	pyrene ND
398	558	~	naphthalene _	9			
NOTES AND		DEFINITIONS FOR THIS	HIS REPORT, nzene	Q			

SCAN = scan number or retention time on chromatogram.

All results reported in ug/L unless otherwise specified.

H-156

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

 \star = benzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

A=benzo(a)anthracene and chrysene co-elute in high concentrations.

B = anthracene and phenanthrene co-elute in high concentrations

PAGE 20 RECEIVED: 08/01/84

Analytical Serv REPORT Results by Sample

LAB # 84-08-013

E EPA Method 624/GC-MS Category	S VERIFIED BY LAK COMPOUNDS DETECTED 3	COMPOUND	1,2-dichloropropane ND	cis-1,3-dichloropropylene ND	trans-1,3-dichloropropylene ND	ethylbenzene ND	methylene chloride ND	methyl chloride ND	methyl bromide ND	bromoform ND	dichlorobromomethane ND	trichlorofluoromethane ND	dichlorodifluoromethane ND	chlorodibromomethane ND	tetrachloroethylene ND	toluene 1886	trichloroethylene ND	vinyl chloride ND
MS 624 NAME 30/84	ST BMS	EPA	320	33V cis-1	33V trans-1	380	44 \	V64	460	470	487	49V tr	56V dic	510	857	798	270	ABB
FRACTION 04B TEST CODE MS 6 Date & Time Collected 07/30/84	ANALYST INSTRUMENT	SCAN	170 3	187 3	187 3	190 3	22V 4	214 4	207 4	>€	127 4	300	130 5	8 >8	24¢ 8	25V 44B B	39V 8	310 8
IN 04B T	38/02/84	RESULT NPDES	ND 1	QN	33	QN		QN	Q	Q		Q	GN CN	g Q	Q	9	QN	
FRACTION 04B Date & Time	DATE INJECTED 08/02/84	COMPOUND	acrolein	acrylonitrile	benzene	carbon tetrachloride	chlorobenzene	1,2-dichloroethane	1, 1, 1-trichloroethane	1,1-dichloroethane	1, 1, 2-trichloroethane	1, 1, 2, 2-tetrachloroethane	chloroethane	bis (chloromethyl) ether	2-chloroethylvinyl ether	chloroform	1,1-dichloroethylene	1,2-trans-dichloroethylene
	4CU08013V04	0				Cat		~	1, 1,	•	m, m,	1,1,2,2		bis (ct	2-ch101		#	1,2-trans
95	3 K	EPA	8	` >	4 >	. 79	\$	100	110	130	140	150	160	170	190	230	290	300
SAMPLE ID 66	DATA FILE CONC. FACTOR	NPBES SCAN	>=	5	30 327	>9	2	H-1	57	140	280	536	> 6	4	100	110	167	267 193

Analytical Serv REPORT Results by Sample	FRACTION 04B TEST CODE MS 624 NA
86	99
PAGE 21 RECEIVED: 08/01/84	SAMPLE ID 66

LAB # 84-08-013 Continued From Above

Date & Time Collected 07/30/84

AME EPA Method 624/GC-MS Category

NOTES

SCAN = scan number or retention time on chromatogram. AND DEFINITIONS FOR THIS REPORT.

All results reported in $\frac{49/1}{1}$ unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

RECEIVED: 08/01/84

SAMPLE 10 7A

Serv Results by Sample Analytical Serv

FRACTION 05A TEST CODE M625 A
Date & Time Collected 07/31/84

NAME Method 625 Acid Compounds Category

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LAB # 84-08-013

밀 9 月 밀 밁 RESULT VERIFIED BY COMPOUNDS DETECTED 4-nitrophenol pentach lorophenol 2, 4-dinitrophenol 2-methyl-4, 6-dinitrophenol phenol COMPOUND BMB ANALYST INSTRUMENT 60A SEA **59A** 64A **65A** EPA NPDES SCAN 7A A A 46 104 4 DATE EXTRACTED 08/01/84
DATE INJECTED 08/06/84 RESULT 밁 밁 皇 g 일 2, 4-dimethylphenol 2, 4, 6-trichlorophenol 2, 4-dichlorophenol 4-chloro-3-methylphenol 2-chlorophenol COMPOUND DATA FILE 2008013001 22A EPA 21A 24A 31A 34A CONC. FACTOR NPDES SCAN 114 88 4 400 24 H-159

ug/L unless otherwise specified. SCAN = scan number or retention time on chromatogram. AND DEFINITIONS FOR THIS REPORT. All results reported in NOTES

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2-nitrophenol

57A

6A

= not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

Analytical Serv REPORT Results by Sample PAGE 23 RECEIVED: 08/01/84

LAB # 84-08-013

B NAME Method 625 Base/Neutrals Category	VERIFIED BY LAK COMPOUNDS DETECTED O	COMPOUND RESULT	N-nitrosodimethylamine ND	N-nitrosodiphenylamine ND	N-nitrosodi-n-propylamine ND	bis(2-ethylhexyl)phthalate ND	butyl benzyl phthalate ND	di-butyl phthalate ND	di-n-octyl phthalate ND	diethyl phthalate ND	dimethyl phthalate ND	benzo(a)anthracene A ND	benzo(a)pyrene ND	benzo(b)fluoranthene * ND	benzo(k)fluoranthene * ND	chrysene A ND	acenaphthylene ND
ION OSA TEST CODE M625 & Time Collected 07/31/84	ANAL YST INSTRUMENT	SCAN EPA	61B	628	829	899	678	889	869	708	718	728	738	748	758	768	778
TESI Illecte		NPDES	418	43B	42B	138	15B	26B	29B	24B	258	S)	89	78	86	188	28
FRACTION OSA Date & Time Co	08/01/84 08/06/84	RESULT	QN	QN	QV	QN	QN	QN	Q	9	Q	Q	QN	Q	QN	Q	Ŷ
FRACTI Date 8	DATE EXTRACTED DATE INJECTED	COMPOUND	acenaphthene	benzidine	1, 2, 4-trichlorobenzene	hexachlorobenzene	hexachloroethane	bis(2-chloroethyl)ether	2-chloronaphthalene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	3,3'dichlorobenzidine	2, 4-dinitrotoluene	2,6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene
	2008013V05	EPA	18	28	8B 1,2	86	12B	188 bis(20B	25B	26B	27B	28B 3, 3	358	36B	37B 1,	39B
SAMPLE ID 7A	DATA FILE CONC. FACTOR	NPDES SCAN E	18	48	46B	338	368	118 1	168 2	20B 2	218 2	228 2	23B 2	27B 3	288 3	29B 3	318 3
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40B 4-chlorophenyl phenyl ether

17B

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anthracene

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PAGE 24 Received:	08/01/84		Analytical Gerv Results	Serv Results by Sample	REPURT PD 1e	LAB # 84-08-013 Continued From Above
SAMPLE ID ZA	7A		FRACTION OSA TEST CODE M625 Date & Time Collected 07/31/84	Collecte	TEST CODE M625 B lected 07/31/84	NAME Method 625 Base/Neutrals Category
148	41B	4-bromophenyl phenyl	nyl ether ND	88 	79B	benzo(ghi)perylene ND
12B	42B	bis(2-chloroisopropyl)	oullether ND	D : 32B	808	fluorene
108	43B	bis(2-chloroethoxy)me	/ methane ND	D : 44B	818	phenanthrene B ND
348	52B	hexachlorobuta	outadiene ND	D : 19B	828	dibenzo(a, h) anthracene ND
358	23B	hexachlorocyclopenta	entadiene <u>ND</u>	<u>0</u> : 378	838	indeno(1,2,3-cd)pyrene ND
388	24B	· sed	isophorone ND	<u>D</u> : 45B	848	pyrene ND
398	55B	je u	naphthalene ND	 		
NOTES AND	DEFINI	NOTES AND DEFINITIONS FOR THIS REPO	REPORT, nzene ND	 Al		
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SCAN = scan number or retention time on chromatogram.

H-161

ug/L unless otherwise specified. All results reported in_ ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

* = banzo(b)fluoranthene and benzo(k)fluoranthene co-elute.

= benzo(a)anthracene and chrysene co-elute in high concentrations.

pprox anthracene and phenanthrene co-elute in high concentrations.

皇 S Ž AK Ż Ž 문 웃 밀 Z 2 2 Ŷ ÿ 문 RESULT COMPOUNDS DETECTED NAME EPA Method 624/6C-MS VERIFIED bromoform vinyl chloride methylene chloride dichlorodifluoromethane chlorodibromomethane tetrach loroethy lene tolvene trichloroethylene 1, 2-dichloropropane 33V trans-1, 3-dichloropropylene ethylbenzene methyl chloride methyl bromide dichlorobromomethane trich lorofluoromethane cis-1, 3-dichloropropylene Category COMPOUND 44 TEST CODE MS 624 Date & Time Collected 07/31/84 ANALYST INSTRUMENT 288 470 490 30°C 517 200 298 877 288 EPA 320 380 440 450 794 487 449 NPDES SCAN Results by Sample >0.00 C 184 186 197 224 214 205 3 124 > 000 134 8 240 290 316 17√ DATE INJECTED 08/02/84 RESULT 물 문 일 9 9 2 일 S 皇 9 Ñ 2 FRACTION 05B S NO. 2 Š acrolein chloroform 1, 2 -trans-dichloroethylene acrylonitrile benzene carbon tetrachloride chlorobenzene 1, 1-dichloroethane chloroethane 2-chloroethylvinyl ether 1, 1-dichloroethylene 1, 2-dichloroethane 1, 1, 1-trichloroethane 1, 1, 2-trichloroethane 1, 1, 2, 2-tetrachloroethane bis (chloromethyl) ether COMPOUND DATA FILE 4CU08013V05 CDNC. FACTOR 1 RECEIVED: 08/01/84 306 EPA 2 110 134 160 177 190 295 ð **4** 3 ⋛ 205 147 150 234 SAMPLE ID 7A NPDES SCAN 2 140 234 202 115 167 267 2 3 2 75. 275 285 **%** 3 3 H-162

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LAB # 84-08-013

REPORT

Analytical Serv

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Analytical Serv REPORT Results by Sample

LAB # 84-08-013 Continued From Above

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SAMPLE ID 7A

FRACTION 05B TEST CODE MS 624
Date & Time Collected 07/31/84

NAME EPA Method 624/6C-MS Category

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79). uq/1 unless otherwise specified. All results reported in

PAGE 27 RECEIVED: 08/01/84

Serv Results by Sample Analytical Serv

LAB # 84-08-013

NAME Method 625 Acid Compounds

Category

The Control of the Co

SAMPLE ID 7C

FRACTION 06A TEST CODE M625 A
Date & Time Collected 07/31/84

COMPOUNDS DETECTED VERIFIED BY ANALYST INSTRUMENT DATE EXTRACTED 08/01/84 DATE INJECTED 08/06/84 DATA FILE 2CU0B013C06

RESULT	S	ND	Q	S	S	
COMPOUND	4-nitrophenol	2, 4-dinitrophenol	2-methyl-4,6-dinitrophenol	pentachlorophenol	phenol	
EPA	58A	59A	60A	64A	65A	
RESULT NPDES SCAN	7 A	∜ in	4 4	9.A	10A	
RESULT	Ö	Q	Q	Q	Q	QN
COMPOUND	2, 4, 6-trichlorophenol	4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2-nitrophenol
EPA	21A	22A	24A	314	344	57A
NPDES SCAN	11A	BA	н- 41	₹ N 164	٩	6 A

AND DEFINITIONS FOR THIS REPORT. NOTES

SCAN = scan number or retention time on chromatogram.

= not detected at EPA detection limit method 625, (Federal Register, 11/26/84). ug/L unless otherwise specified. All results reported in

PAGE 28 RECEIVED: 08/01/84

Analytical Serv Results by Sample

LAB # 84-08-013

B NAME Method 625 Base/Neutrals	25000+r.
FRACTION 06A TEST CODE M625 B	
FRACTION OGA	C ART OF REAL
3/ 0	
SAMPLE II	

DATA FILE 2C CONC. FACTOR LB 18 4B SB 4B SB 4B SB 36B 12B 36B 12B 20B 20B 21B 20B 21B 20B 22B 22B 27B 28B 27B 28B 27B 28B 27B 35B 27B 37B 29B 37B 31B 39B

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PAGE 29 RECEIVED: 08/01/84	: 08/01/		Analytical Serv Resul	برد ج ج	Serv REPORT Results by Sample		LAB # 84-08-013 Continued From Above
SAMPLE 10 70	JZ 0		FRACTION OGA Date & Time C	$\overline{}$	FRACTION OGA TEST CODE M625 B Date & Time Collected 07/31/84	M625 B	NAME Method 625 Base/Neutrals Category
148	418	4-bromophenyl pheny	ether		88	798	benzo(ghi)perylene ND
12B	42B	bis(2-chloroisopropy)	opyl)ether	Q	32B	808	fluorene ND
108	43B	bis(2-chlaroethaxy)m	xy)methane	9	44B	818	phenanthrene B ND
34B	52B	hexachlorobut	obutadiene	 9	198	828	dibenzo(a, h)anthracene ND
938	23B	hexachlorocyclopent	pentadiene	9	378	838	indeno(1, 2, 3-cd)pyrene ND
388	54B		isophorone	g	45B	848	byrene ND
398	558		naphthalene	<u>S</u>			
NOTES AND	D DEFIN	DEFINITIONS FOR THIS REPORT	PORT, nzene	9			
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SCAN = scan number or retention time on chromatogram.

ug/L unless otherwise specified. All results reported in_

H-166

ND = not detected at EPA detection limit method 625, (Federal Register, 11/26/84).

 \star = henzo(b)fluorantheme and benzo(k)fluorantheme co-elute.

= benzo(a)anthracene and chrysene co-elute in high concentrations.

= anthracene and phenanthrene co-elute in high concentrations.

PAGE 30 RECEIVED: 08/01/84

Analytical Serv REPORT Results by Sample

LAB # 84-08-013

EST TO SECURITION CONTRACTOR TO SECURITION CONTRACTOR C

NAME EPA Method 624/GC-MS TEST CODE MS 624 FRACTION O6B SAMPLE 10 7C

Category	BMS VERIFIED BY LAK	COMPOUND	1, 2-dichloropropane NB	is-1, 3-dichloropropylene ND	trans-1, 3-dichloropropylene ND	ethylbenzene ND	methylene chloride NB	methyl chloride NB	methyl bromide ND	bromoform NB	dichlorobromomethane NB	trichlorofluoromethane ND	dichlorodifluoromethane ND	chlorodibromomethane ND	tetrachloroethylene ND	toluene ND	trichloroethylene ND	vinyl chloride ND	
07/31/84	ANALYST TRUMENT	EPA	726	3 755	33V tra	384	44	450	460	470	487	497	200	>10	857	967	877	A38	
	ANALYST INSTRUMENT	NPDES SCAN	170	184	187	196	227	214	207	> 6	120	300	130	80	240	257	294	310	
Time Collected	08/02/84	RESULT N	Q	Q	Q	잎	Q	Q	Q	Q		Q.	GN	QN	QN	QN	물	QN O	
Date &	DATE INJECTED	COMPOUND	acrolein	acrylonitrile	benzene	carbon tetrachloride	chlorobenzene	1,2-dichloroethane	1, 1, 1-trichloroethane	1,1-dichloroethane	1, 1, 2-trichloroethane	1, 1, 2, 2—tetrachloroethane	chloroethane	bis (chloromethyl) ether	2-chloroethylvinyl ether	chloroform	1,1-dichloroethylene	1,2-trans-dichloroethylene	
	08013V06					Ú			1 44		#	1,1,2,		bis (2-ch1		744	1,2-tra	
	1LE 4CU	N EPA	25	æ	4	۸9	2	100	110	130	140	150	160	170	190	234	294	300	
	DATA FILE 4CU0B013V06 CONC. FACTOR 1	NPDES SCAN	10	5	> %	^9	?	150	 ₹	≥ 1–167	287	230	>6	4 >	100	110	167	267	

PAGE 31 RECEIVED: 08/01/84

Analytical Serv REFORT Results by Sample

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LAB # 84-08-013 Continued From Above

SAMPLE 10 7C

FRAC

FRACTION 06B TEST CODE MS 624
Date & Time Collected 07/31/84

NAME EPA Method 624/GC-MS Category

Date &

NOTES AND DEFINITIONS FOR THIS REPORT.

SCAN = scan number or retention time on chromatogram.

All results reported in $\frac{uq/l}{l}$ unless otherwise specified. ND = not detected at EPA detection limit method 624, (Federal Register, 12/3/79).

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Analytical Serv REPORT NonReported Work PAGE 32 RECEIVED: 08/01/84

FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE DUP 624
DUP 624
DUP 624
DUP 624
DUP 624 010 020 030 040 050

specific matrix was not within acceptable limits indicating Indicates a value less than 5 times the detection limit CONTACT CONOVER @ Indicates that spike recovery for this analysis on the second column confirmation performed on samples CERTIFIED BY Potential error for such low values ranges between 50 and 100%. Analytical Serv TEST CODES and NAMES used on this report PREPARED Radian Analutical Services BY 8501 MoPac Blvd. Footnotes and Comments Duplicate of report of 08/16/84 Austin, Texas 78766 (512) 454-4797 an interferent present. 6Β, **'89** ATTEN PHONE No te: SAMPLES SAMPLE IDENTIFICATION ATTEN WILLIAM LISTE 212-027-21-05 Tinker AFB wells, 601 REPORT Radian Austin TINKER Fed Ex CLIENT TRANS WORK ID TAKEN FACILITY P. O. INC. 92 몡 9 의영입입입 H-170

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LAB # 84-08-020

Analytical Serv REPORT 04/26/85 12:10:29

RECEIVED: 08/02/84

VERIFIED BY COMPOUNDS DETECTED Trichloroethene Bromoform 2-Chloroethylvinyl Ether 1, 4-Dichlorobenzene Chlorobenzene 1, 3-Dichlorobenzene 1, 2-Dichlorobenzene TEST CODE GC 601 NAME EPA Method 601/GC Dibromochloromethane 1, 1, 2-Trichloroethane cis-1, 3-Dichloropropene 1, 1, 2, 2-Tetrachloroethane **Tetrachloroethylene** LAB # 84-08-020 Category COMPOUND RAM Date & Time Collected not specified ANALYST Serv REPORT Results by Sample SCAN DATE INJECTED 08/09/84 FRACTION OIA 2 밁 S 웆 일 0 8 0 ci ci RESULT () () 윋 Analytical Serv Chloromethane Vinyl Chloride Bromomethane Methylene Chloride 1,1-Dichloroethane Chloroform Chloroethane Trichlorofluoromethane 1, 1-Dichloroethene trans-1, 2-Dichloroethene 1, 2-Dichloroethane 1, 1, 1-Trichloroethane Carbon Tetrachloride COMPOUND RECEIVED: 08/02/84 SAMPLE 10 6A DATA FILE CONC. FACTOR SCAN H-171

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1,2-Dichloropropane

trans-1, 3-Dichloropropene

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Bromodichloromethane

PAGE 3 RECEIVED: 08/02/84

Serv REPORT Analytical Serv

LAB # 84-08-020 Continued From Above

SEEST MARKET CONTROL C

SAMPLE ID 6A

FRACTION OIA TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, .1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute Register, SCAN = scan number or retention time on chromatogram. All results reported in uq/L unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute.

H-172

VERIFIED BY COMPOUNDS DETECTED Trichloroethene Chlorobenzene 1, 2-Bichlorobenzene 1, 4-Dichlorobenzene 2-Chloroethylvinyl Ether 1, 3-Dichlorobenzene NAME EPA Method 601/GC Dibromochloromethane 1, 1, 2-Trichloroethane 1, 1, 2, 2-Tetrachloroethane **Tetrachloroethylene** cis-1, 3-Bichloropropene Category COMPOUND RAM Date & Time Collected not specified TEST CODE GC 601 ANALYST INSTRUMENT SCAN DATE INJECTED 08/09/84 FRACTION 02A 皇 g 윋 S 2 19.6 밀 밁 2 RESULT Chloromethane Vinyl Chloride Bromomethane Chloroethane Methylene Chloride Trichlorofluoromethane 1, 1-Dichloroethene 1, 1-Dichloroethane trans-1, 2-Dichloroethene Chloroform 1, 2-Bichloroethane 1, 1, 1-Trichloroethane Carbon Tetrachloride COMPOUND DATA FILE CONC. FACTOR SAMPLE 10 68 SCAN H-173

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2

Bromoform

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S

Bromodichloromethane

1,2-Dichloropropane

물

trans-1, 3-Dichloropropene

LAB # 84-08-020

Serv Results by Sample

Analytical Serv

RECEIVED: 08/02/84

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RESULT

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RECEIVED: 08/02/84

Analytical Serv REPORT Results by Sample

LAB # 84-08-020 Continued From Above

SAMPLE ID 68

FRACTION 02A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in $\frac{197L}{1000}$ unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram.

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PAGE 6 RECEIVED: 08/02/84

Analytical Serv REPORT Results by Sample

LAB # 84-08-020

RECEIVED: 08/02/84

Results by Sample Analytical Serv

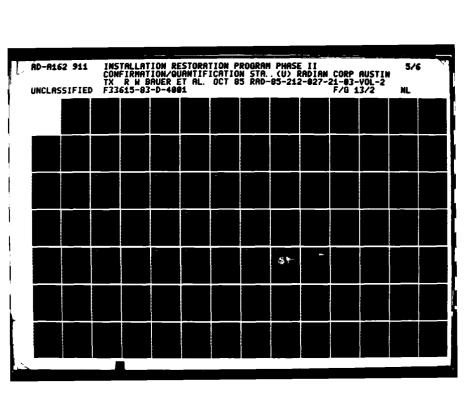
LAB # 84-08-020 Continued From Above

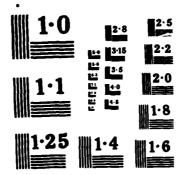
SAMPLE ID 6D

NAME EPA Method 601/GC FRACTION 03A TEST CODE GC 501 NA Date & Time Collected not specified

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in <u>ug/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. ug/L unless otherwise specified SCAN = scan number or retention time on chromatogram.





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VERIFIED BY COMPOUNDS DETECTED Trichloroethene Bromoform 2-Chloroethylvinyl Ether 1, 3-Dichlorobenzene 1, 2-Dichlorobenzene 1, 4-Dichlorobenzene Chlorobenzene NAME EPA Method 601/GC 1, 1, 2, 2-Tetrachloroethane Tetrachloroethylene Dibromoch loromethane 1, 1, 2-Trichloroethane cis-1, 3-Dichloropropene Category COMPOUND MCL Date & Time Collected not specified TEST CODE GC 601 ANALYST INSTRUMENT SCAN Serv REPORT Results by Sample DATE INJECTED 08/09/84 FRACTION 04A 밁 2 S 9 ᄝ 밀 밁 9 뮏 9 0.6 RESULT Chloroform Chloromethane Bromomethane Vinyl Chloride Chloroethane Methylene Chloride **Trichlorofluoromethane** trans-1, 2-Dichloroethene 1, 2-Dichloroethane Carbon Tetrachloride trans-1, 3-Dichloropropene 1, 1-Dichloroethene 1, 1-Dichloroethane 1, 1, 1-Trichloroethane Bromodichloromethane 1,2-Dichloropropane COMPOUND PAGE 8 RECEIVED: 08/02/84 SAMPLE 1D 66 DATA FILE CONC. FACTOR SCAN H-177

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Analytical Serv REPORT Results by Sample

LAB # 84-08-020 Continued From Above

SAMPLE ID 66

FRACTION 04A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. All results reported in ug/L unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79) #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute SCAN = scan number or retention time on chromatogram.

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PAGE 10 RECEIVED	PAGE 10 RECEIVED: 08/02/84	Analytical	cal Serv REP Results by Sample	REPORT Sample	LAB # 84-08-020
SAMPLE 10 76	D 76	FRA	FRACTION OSA Date & Time Co.	FRACTION 05A TEST CODE GC 601 N Date & Time Collected not specified	Fied Category
DATA FILE CONC. FACTOR		B DATE INJECT	INJECTED 08/10/84	ANALYST	MCL VERIFIED BY JSG COMPOUNDS DETECTED 0
SCAN	NA	COMPOUND	RESULT	SCAN	COMPOUND
	i	Chloromethane	ON eu		Trichloroethene ND
ļ	1	Bromomethane	ue ND		Dibromochloromethane * ND
	1	Vingl Chloride	de ND		1, 1, 2-Trichloroethane * ND
-	I	Chloroethane	an ND		cis-1,3-Dichloropropene * ND
ļ	ı	Methylene Chloride	QN ep		2-Chloroethylvinyl Ether ND
H-1	1	Trichlorofluoromethane	ON eu		Bromoform ND
79	ı	1,1-Dichloroethene	QN eu		1, 1, 2, 2-Tetrachloroethane # ND
	1	1, 1-Dichloroethane	ON eu		Tetrachloroethylene # ND
	trani	trans-1,2-Dichloroethene	ON eu		Chlorobenzene ND
	i	Chloroform	GN W1	***************************************	1, 3-Dichlorobenzene ND
1	1	1,2-Dichloroethane	N e u		1, 2-Dichlorobenzene ND
		1, 1, 1-Trichloroethane	ue ND		1, 4-Dichlorobenzene ND
		Carbon Tetrachloride	de ND		
	-	Bromodichloromethane	ON Pu		
1	ı	1, 2-Dichloropropane	ON ON		
	trans-	trans-1,3-Dichloropropene	an ND		

LAB # 84-08-020 Continued From Above serv Results by Sample Analytical Serv PAGE 11 RECEIVED: 08/02/84

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FRACTION 05A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category SAMPLE ID 76

NOTES AND DEFINITIONS FOR THIS REPORT.

ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). **Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. unless otherwise specified SCAN = scan number or retention time on chromatogram All results reported in_

LAB # 84-08-020

Serv REPORT NonReported Work FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE Analytical Serv PAGE 12 RECEIVED: 08/02/84

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LAB # 84-08-167

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Austin, Texas 78766 PREPARED <u>Radian Analutical</u> BY <u>8501 MoPac Blvd.</u> . O. Box 9948 ATTEN William Little Radian Bl. 4 Austin REPORT F

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SAMPLES Tinker AFB TINKER CL IENT COMPANY FACILITY

(512) 454-4797 ATTEN

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Note: Second column confirmation performed on Split 4A

Duplicate of report of 09/05/84

* Indicates a value less than 5 times the detection limit. Potential error for such low values ranges between

Footnotes and Comments

50 and 100%

specific matrix was not within acceptable limits indicating @ Indicates that soike recovery for this analysis on the

an interferent present

Analytical Serv TEST CODES and NAMES used on this report GC 601 EPA Method 601/GC

SAMPLE IDENTIFICATION 8/14 의임임의의

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WORK ID TAKEN

VERIFIED BY COMPOUNDS DETECTED Trichloroethene Bromoform 2-Chloroethylvinyl Ether Chlorobenzene 1, 3-Dichlorobenzene 1, 2-Dichlorobenzene 1, 4-Dichlorobenzene TEST CODE GC 601 NAME EPA Method 601/GC cis-1, 3-Dichloropropene 1, 1, 2, 2-Tetrachloroethane Tetrach loroethy lene Dibromoch loromethane 1, 1, 2-Trichloroethane Category COMPOUND MCL Date & Time Collected not specified ANALYST INSTRUMENT Serv REPORT Results by Sample SCAN DATE INJECTED 08/23/84 FRACTION 01A S 2 2 Ş 2 2 2 Ş S RESUL T Chloroform Chloromethane Bromomethane Methylene Chloride Trichlorofluoromethane 1, 1-Dichloroethene 1, 1-Dichloroethane trans-1, 2-Dichloroethene 1, 1, 1-Trichloroethane Carbon Tetrachloride Vinyl Chloride Chloroethane 1, 2-Dichloroethane COMPOUND PAGE 2 RECEIVED: 08/16/84 SAMPLE 10 6E DATA FILE CONC. FACTOR SCAN H-183

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1, 2-Dichloropropane

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Bromodichloromethane

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trans-1, 3-Dichloropropene

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SAMPLE 1D 6E

FRACTION OIA TEST CODE GC 601 No Date & Time Collected not specified

EST CODE GC 601 NAME EPA Method 601/GC cted not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79) #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute. ug/L unless otherwise specified. SCAN = scan number or retention time on chromatogram. All results reported in_

Serv REPORT LAB # 84-08-167 Results by Sample	FRACTION 02A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category	84 ANALYST MCL VERIFIED BY JSG INSTRUMENT A COMPOUNDS DETECTED O	SCAN COMPOUND RESULT	Trichloroethene	Dibromochloromethane *	1, 1, 2-Trichloroethane *	cis-1, 3-Dichloropropene *	2-Chloroethylvinyl Ether	Bromoform	1, 1, 2, 2-Tetrachloroethane #	Tetrachloroethylene #	Chlorobenzene	1, 3-Dichlorobenzene	1, 2-Dichlorobenzene	1, 4-Dichlorobenzene				
Analytical	FRACTION 02A Date & Time (A DATE INJECTED 08/23/84	COMPOUND	Chloromethane ND	Bromomethane ND	Vinyl Chloride ND	Chloroethane ND	Methylene Chloride ND	Trichlorofluoromethane ND	1, 1-Dichloroethene ND	1, 1-Dichloroethane ND	trans-1, 2-Dichloroethene ND	Chloroform ND	1,2-Dichloroethane ND	1, 1, 1-Trichloroethane ND	Carbon Tetrachloride ND	Bromodichloromethane ND	1, 2-Dichloropropane ND	trans-1, 3-Dichloropropene ND
PAGE 4 RECEIVED: 08/16/84	SAMPLE 10 6F	DATA FILE CONC. FACTOR	SCAN						 H	-185					ļ				

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Serv REPORT Results by Sample Analytical Serv

LAB # 84-08-167 Continued From Above

SAMPLE 10 6F

FRACTION 02A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

Category

NOTES AND DEFINITIONS FOR THIS REPORT

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute ND = not detected at EPA detection limit method 601, (Federal Register, #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute. ug/L unless otherwise specified. SCAN = scan number or retention time on chromatogram All results reported in

	CORPORATION				
PAGE 5 RECEIVED: 08/16/84	94	Analytical Serv Resul	Serv REP Results by Sample	REPORT Imple	LAB # 84-08-167
SAMPLE ID 7C, 8/14	8/14	FRACTION O3A TEST CODE Date & Time Collected not	03A Te Colle		GC 601 NAME EPA Method 601/GC specified Category
DATA FILECONC. FACTOR	⋖	DATE INJECTED <u>08/23/84</u>	23/84		MCL A CD
SCAN	COMPOUND	UND RESULT	UL T	SCAN	COMPOUND
		Chloromethane			Trichloroethene ND
		Bromomethane	9		Dibromochloromethane * ND
	>	Vinyl Chloride	Q		1, 1, 2-Trichloroethane * ND
		Chloroethane	9		cis-1, 3-Dichloropropene * ND
	Methy	Methylene Chloride			2-Chloroethylvinyl Ether ND
 H-	Trichlorofluorome	fluoromethane	Q)		Bromoform ND
-187	1, 1-D	1,1-Bichloroethene	2	İ	1, 1, 2, 2-Tetrachloroethane # ND
	1, 1-D	1, 1-Dichloroethane	일		Tetrachloroethylene # ND
	trans-1, 2-D	trans-1, 2-Dichloroethene	9		Chlorobenzene ND
		Chloroform	郞		1,3-Dichlorobenzene ND
	1, 2-D	1, 2-Dichloroethane	Q Q		1, 2-Dichlorobenzene ND
	1, 1, 1-Tr	1, 1, 1-Trichloroethane	외		1, 4-Dichlorobenzene ND
İ	Carbon	Carbon Tetrachloride	9		
	Bromodi	Bromodich loromethane	 임		
	1,2-Di	1, 2-Dichloropropane	S		
	trans-1, 3-Di	trans-1, 3-Dichloropropene	QN C		

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Continued From Above LAB # 84-08-167

SAMPLE ID 7C, 8/14

FRACTION 03A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute. ug/L unless otherwise specified. SCAN = scan number or retention time on chromatogram

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Analytical Serv REPORT Results by Sample

LAB # 84-08-167

SAMPLE ID 7A	FRACTI Date &	FRACTION O4A TEST Date & Time Collect	FRACTION 04A TEST CODE GC 601 N Date & Time Collected not specified	NAME EPA Method 601/GC led Category
DATA FILE		08/23/84	ANALYST INSTRUMENT	MCL VERIFIED BY JSG A COMPOUNDS DETECTED 5
SCAN	COMPOUND	RESULT	SCAN	COMPOUND RESULT
	Chloromethane	Q	n	Trichloroethene 0.5
	Bromomethane	Ŝ		Dibromochloromethane * ND
	Vinyl Chloride	Q		1, 1, 2-Trichloroethane * ND
***************************************	Chloroethane	Q		cis-1,3-Dichloropropene * ND
	Methylene Chloride	Q		2-Chloroethylvinyl Ether ND
-	Trichlorofluoromethane	0.2		Bromoform ND
H-1	1,1-Dichloroethene	2	1, 1,	1, 1, 2, 2-Tetrachloroethane # ND
N 89	1,1-Dichloroethane	9.6		Tetrachloroethylene # ND
m	trans-1, 2-Dichloroethene	0.4		Chlorobenzene ND
	Chloroform	Q		1, 3-Dichlorobenzene ND
4	1,2-Dichloroethane	0.2		1,2-Dichlorobenzene ND
	1, 1, 1-Trichloroethane			1, 4-Dichlorobenzene ND
	Carbon Tetrachloride	QN		
	Bromodichloromethane	Q		
	1,2-Dichloropropane	Q		
	trans-1,3-Dichloropropene	QN		

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Serv Results by Sample

Continued From Above LAB # 84-08-167

SAMPLE ID 7A

FRACTION 04A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category

NOTES AND DEFINITIONS FOR THIS REPORT

*Dibromochloromethans, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79) #1,1,2,2-tetrachloroethane and tetrachloroethylene co-elute ug/L unless otherwise specified. SCAN = scan number or retention time on chromatogram

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LAB # 84-08-167

Analytical Serv REPORT Results by Sample

TEST CODE GC 601 NAME EPA Method 601/GC ected not specified Category	ANALYST MCL VERIFIED BY JSG TRUMENT A COMPOUNDS DETECTED O	COMPOUND RESULT	Trichloroethene ND	Dibromochloromethane * ND	1, 1, 2-Trichloroethane * ND	cis-1,3-Dichloropropene * ND	2-Chloroethylvinyl Ether ND	Bromoform ND	1, 1, 2, 2-Tetrachloroethane # ND	Tetrachloroethylene # ND	Chlorobenzene ND	1, 3-Dichlorobenzene ND
TEST CODE	ANALYST INSTRUMENT	SCAN										
FRACTION OSA TEST CODE GC 601 N Date & Time Collected not specified	A DATE INJECTED 08/23/84	COMPOUND	Chloromethane ND	Bromomethane ND	Vinyl Chloride ND	Chloroethane ND	Methylene Chloride ND	Trichlorofluoromethane ND	1, 1-Dichloroethene ND	1, 1-Dichloroethane ND	trans-1, 2-Dichloroethene ND	Chloroform ND
SAMPLE ID 7C, 8/15	DATA FILE CONC. FACTOR	SCAN							-191	İ		

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1, 2-Dichlorobenzene

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1, 4-Dichlorobenzene

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1, 1, 1-Trichloroethane

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Carbon Tetrachloride

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Bromodichloromethane

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1,2-Dichloroethane

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1, 2-Dichloropropane

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trans-1, 3-Dichloropropene

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Continued From Above FRACTION 05A TEST CODE GC 601 NAME EPA Method 601/GC Date & Time Collected not specified Category LAB # 84-08-167 serv Results by Sample SAMPLE 10 7C, 8/15

NOTES AND DEFINITIONS FOR THIS REPORT.

*Dibromochloromethane, 1,1,2-trichloroethane and cis-1,3-dichloropropene co-elute All results reported in <u>ug/L</u> unless otherwise specified. ND = not detected at EPA detection limit method 601, (Federal Register, 12/3/79). #1, 1, 2, 2-tetrachloroethane and tetrachloroethylene co-elute. SCAN = scan number or retention time on chromatogram All results reported in_

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FRACTION AND TEST CODES FOR WORK NOT REPORTED ELSEWHERE

O18 : DUP 601
028 : DUP 601
038 : DUP 601
048 : DUP 601
058 : DUP 601



APPENDIX I Correspondence with Federal, State and/or Local Regulatory Authorities [not used]



APPENDIX J
References

配子 シンドンド (Manager Manager Bingham, Roy H. and Robert L. Moore, 1975, Reconnaissance of the Water Resources of the Oklahoma City Quadrangle, Central Oklahoma, Oklahoma Geological Survey Hydrologic Atlas 4.
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APPENDIX K Biographies of Key Personnel

Thomas W. Grimshaw - Program Manager
William M. Little - Project Director
Lawrence N. French - Supervising Geologist
Robert C. Wallace - Pit and Tank Surveying
David H. Gancarz - Sediment Sampling
Nancy P. Stein - Monitor Well sampling
Jill P. Rossi - Cartographer
Ann E. S.Clair - Technical Review

THOMAS W. GRIMSHAW

EDUCATION:

Ph.D., Geology, University of Texas at Austin, 1976.

M.S., Geology, University of Texas at Austin, 1970.

B.S., Geological Engineering, South Dakota School of Mines and Technology, 1967.

EXPERIENCE:

Division Manager, Policy and Environmental Analysis Division, Radian Corporation, Austin, TX, 1982-Present.

Department Head, Environmental Analysis Department, Radian Corporation, 1978-1982.

Group Leader, Radian Corporation, 1976-1978.

Teaching Assistant, The University of Texas at Austin, 1974.

Captain (R&D Coordinator), U.S. Army, 1970-1972.

Geologist, Junior Grade, Amoco Production Company, 1969-1970.

Geologic Field Assistant, Amoco Production Company, 1967.

Certification: AIPG Certified Professional Geologist No. 4425

FIELDS OF EXPERIENCE:

Dr. Grimshaw has served in a technical and management role in numerous programs at Radian. Most recently, he has been the Technical Coordinator for several survey programs for Environmental Impairment Liability insurance applications. He has also performed or participated in several surveys, including a hazardous waste disposal site, large wastewater treatment plants, pulp and paper mills, aluminum forging and extrusion plants, and a large sanitary landfill.

Dr. Grimshaw is currently acting as Program Manager for two programs for site investigation and remedial action planning for solid/hazardous waste disposal and related activities at installations of the U.S. Air Force. These programs are being conducted at bases in Texas and Louisiana as part of the Air Force's Installation Restoration Program.

In recent months, Dr. Grimshaw has been the Technical Coordinator for a large program being conducted by a major paper company to develop Closure Plans for

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Thomas W. Grimshaw

impoundments at wood treatment plants in three states. This program included a full complement of studies to define the existing situation and prepare a plan of remedial action for each plant. The initial activity was the sampling and analysis of pond supernatant and sludge, subsoil, and ground water. Bench-scale stabilization studies were performed on the sludge using a number of candidate commercial stabilizing compounds. Several closure alternatives were developed and screened, and a set of alternatives was selected for inclusion in conceptual plans. After the conceptual plans were approved by the client and the regulatory agency, a detailed design was prepared and specifications developed.

For Tuloma Energies, Inc., Radian performed a program directed by Dr. Grimshaw for development of a commercial Hazardous Waste Management Facility in north-eastern Oklahoma. During the initial phases of this project, a market analysis was performed to determine the sources at waste that could potentially use the new facility. Subsequently, a regional screening analysis was performed to identify areas most likely to have suitable sites for the new facility. This analysis included screening for several factors, including hydrologic, geologic, topographic, ecologic, and aerometric characteristics as well as population density. Dr. Grimshaw assisted Tuloma Energies in coordinating with the state regulatory agency (Oklahoma Department of Health) during the initial phases of the project. The project is currently being held in abeyance pending improvement in the national economy.

Dr. Grimshaw was Project Director for two programs for a major paper company to evaluate the potential risk of proposed solid waste management plans for paper mills in Arkansas and Mississippi. These programs included collection of waste, soil, and ground-water samples, analysis of the wastes, and batch extraction of the wastes followed by analysis of the leachates. In addition, leachates were generated and attenuated in waste and soil columns to evaluate the capacity of the subsoil to attenuate any leachate that might escape from the disposal site. A ground-water flow model was used to assess the rate and direction of contaminant movement if contaminants were to reach the water table.

Dr. Grimshaw was Technical Director for a generic environmental assessment of wastes from fluidized bed combustion for the U.S. Environmental Protection Agency (EPA). Emphasis was placed on potential hydrologic impacts. Both laboratory studies and field lysimeter tests were conducted in the study. The objectives were to identify and investigate key variables which determine the acceptability of FBC waste disposal and to establish a reliable empirical correlation between laboratory and field results so that better conclusions on field effects can be drawn on the basis of laboratory studies. Provisions of the Resource Convervation and Recovery Act are allowed for in the investigation. Since the regulatory situation for FBC wastes was unclear during conduct of the program, provisions were made for both the eventuality that leachate migration will be allowed in the substrate below the landfill and that leachate escape will be controlled by liners. Interactions between

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Thomas W. Grimshaw

leachate and representative disposal media and between leachate and several candidate liner materials were investigated in laboratory studies.

Dr. Grimshaw was also Technical Director for a program to investigate the ground-water impact of a spill of a coal-distillate liquid fuel at an SRC-II (Solvent Refined Coal) pilot plant at Fort Lewis Military Reservation near Tacoma, Pierce County, Washington. The spill site was underlain by highly permeable soils with a water table aquifer at a depth of approximately 30 feet. The study involved detailed coring to establish the location and extent of unsaturated zone cotamination and designing and constructing a set of ground-water monitoring wells to define the extent of ground-water contamination that had occurred. Analytical chemistry support was provided for Resource Conservation and Recovery Act (RCRA) Extraction Procedure testing of contaminated soils and for ground-water quality evaluation. A Remedial Measures Plan was formulated and implemented to remove contaminated material and to prevent the further spread of ground-water contamination. Measures included partial excavation of contaminated soils and installation of production wells for ground-water flow control. This program involved extensive coordination and interfacing with the states regulatory authority (Washington Department of Ecology).

In a follow-up program for which Dr. Grimshaw was again Technical Director, Radian evaluated the overall hydrogeologic impact of the entire SRC plant in addition to the spill area. This program again involved soil sampling, extraction, and analysis as well as water quality monitor well installation and sampling. A zone of contamination was identified, and a comprehensive Remedial Measures Plan was prepared to address the problem.

In a program for Utah International, Incorporated, Dr. Grimshaw was responsible for evaluating the implications of RCRA on the company's mining operations under various regulatory scenarios. Special reference was made to UI's proposed Springer Mine which is in Pershing County, Nevada. Several issues concerning the application of RCRA regulations to metal mines emerged, including the following: (1) applicability of the procedure for classifying solid waste as hazardous or non-hazardous; (2) problems associated with applying disposal regulations to all operations; (3) difficulties in applying limited interim regulations pending development of final regulations; (4) integration of RCRA regulations with other regulations, especially the Clean Water Act; and (5) the appropriateness of certain specific provisions of the regulations such as flood plain definition, financial requirements, and monitoring requirements.

Dr. Grimshaw was Technical Director for the first phase of a project to investigate the environmental feasibility of disposing of flue gas desulfurization (FGD) wastes, ash and sludge, from a mine mouth power plant by backfilling into the associated surface mine in northwestern Colorado. He also had major supervisory and hydrogeologic interpretation roles in the second phase of the program, which included extensive field studies. These field studies included infiltration tests of the mine floor and overburden, water balance

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Thomas W. Grimshaw

investigations to estimate ground-water recharge, and emplacement of piezometers to ascertain the direction of ground-water flow. A major output of this program was a rating of the various parts of the large surface mine in terms of suitability for ash and sludge disposal.

Dr. Grimshaw was a Task Leader in a program for the EPA ground-water laboratory (Robert S. Kerr Environmental Research Laboratory) to investigate a technique for identifying sources of nitrate ions in ground waters and soils using stable nitrogen isotopes. The usefulness of nitrogen isotope ratios for differentiating sources of nitrate pollution (septic tanks, feedlots, barnyards, and lands receiving municipal waste waters) was evaluated. Soil samples were obtained both by surface augering and by deep boring and coring, and groundwater samples were collected from existing shallow wells. A total of 66 soil samples and contaminated ground waters were analyzed for nitrate, chloride, and for nitrate-nitrogen isotopic composition. Standard statistical techniques were used to analyze the observed variations in 615N values, with respect to several nitrate-ion sources and various environmental factors.

For a comprehensive environmental assessment for a proposed large lignite mine in Texas, Dr. Grimshaw prepared and conducted an aquifer test program. These efforts included design of the pump wells and piezometers, layout of the well configuration in the field, oversight of well drilling operations, conduct of the two pump tests, and interpretation of the results in terms of the basic aquifer parameters. In another program related to this mine, Dr. Grimshaw was responsible for evaluating the potential effects on ground water resulting from disposal of ash and FGD solids from a power plant by emplacement of the wastes in the mine.

Prior to his employment by Radian Corporation, Dr. Grimshaw was employed as an oil and gas exploration geologist by Amoco Production Company, Denver, Colorado. Initially, he was a geologic field assistant near the coast of the Gulf of Alaska. This work entailed measuring, describing, and collecting stratigraphic sections in the Tertiary rocks in the vicinity of Cordova and Cape Yakataga, Alaska. Subsequently, Dr. Grimshaw was involved in a gas and petroleum exploration program in northcentral Montana. Most of the effort was in working out the stratigraphy and structural geology in the area of investigation, and he served for a time as well-site geologist on gas exploration wells. In addition, he launched a program of regional exploration in a much larger area in Montana. This work included study of down-hole geophysical logs, preparation of structural contour maps, and assembly of isopachous maps.

HONORARY AND PROFESSIONAL SOCIETIES:

Sigma Xi, Phi Kappa Phi, Sigma Tau, Sigma Gamma Epsilon, Geological Society of America, American Association of Petroleum Geologists, Association of Engineering Geologists.

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Thomas W. Grimshaw

PUBLICATIONS/REPORTS:

Grimshaw, T.W. and W.M. Little, "Remedial Measures Plan for a Spill of Solvent Refined Coal Liquid at the SRC Pilot Plant, Ft. Lewis, Washington," Radian Corporation, Austin, TX, August 1980.

Grimshaw, T.W., et al., "Generation and Attenuation of Leachate from Fluidized Bed Combustion Solid Wastes: First Year Progress Report," Radian Corporation, Austin, TX, April 1980.

French, L.N., J.C. Lacy, and T.W. Grimshaw, "Regulation of the Hydrologic Impacts of In-Situ Fossil Fuel Recovery," Radian Corporation, Austin, TX, April 1980.

Grimshaw, T.W., et al., "Hydrology-Related Regulatory Risk for a Proposed Lignite Mine in East Texas," Radian Corporation, Austin, TX, December 1979.

Wolterink, T.J., H.J. Williamson, T.W. Grimshaw, and W.F. Holland, "Identifying Sources of Subsurface Nitrate Pollution with Stable Nitrogen Isotopes," Radian Corporation, Austin, TX, August, 1979.

Grimshaw, T.W., et al., "Environmental Impact Statement for the San Antonio, Texas, Wastewater Treatment System," Radian Corporation, Austin, TX, August 1979.

Radian Corporation and Oklahoma University Staff, "Energy from the West: Impact Analysis Report Volume II, Site-Specific and Regional Impact Analyses," Radian Corporation, Austin, TX, March 1979.

Grimshaw, T.W., et al., "Implications of the Resource Conservation and Recovery Act for the Metals Mining Industry: A Case Study of the Springer Project," Radian Corporation, Austin, TX, March 1979.

Grimshaw, T.W., et al., "Preliminary Evaluation of the Hydrologic Impacts of Utilizing the Trapper Mine for Disposal of Wastes from the Craig Station Power Plant, Moffat County, Colorado," Radian Corporation, Austin, TX, October 1980.

James, S.N., T.W. Grimshaw, and J.L. Machin, "Evaluation of Factors Affecting the Acceptability of the Proposed Site for the Erie Mining Company Industrial Fuel Gas Demonstration Plant," Radian Corporation, Austin, TX, August 1978.

Menzies, W.R., et al, "Coal and Lignite Resources for a Medium-Btu Gasification Plant in Texas," Radian Corporation, Austin, TX, May 1978.

Grimshaw, T.W., et al., "Environmental Assessment for the Planned Texas Power and Light Company Sandow Generating Station Unit Number Four, Milam County, Texas," Radian Corporation, Austin, TX, May 1978.

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Thomas W. Grimshaw

Holland, W.F., et al., "Environmental Inventory and Assessment for the Proposed Yegua Mine, Milam County, Texas," Radian Corporation, Austin, TX, December 1977.

Grimshaw, T.W., J.L. Machin, and L. Michel, "An Evaluation of Factors Affecting Acceptability of the Proposed Site for the Conoco Coal Development Coal Company Coal Conversion Facility, Noble County, Ohio," Radian Corporation, Austin, TX, November 1977.

Machin, J.L. and T.W. Grimshaw, "Investigation of Water Quality Impacts Related to Development of the Horsepan Creek Basin, Guilford County, North Carolina," Radian Corporation, Austin, TX, October 1977.

Grimshaw, T.W., et al., "Preliminary Environmental Assessment for a Proposed Lignite Surface Mine near Athens, Texas," Radian Corporation, Austin, TX, October 1977.

Holland, W.F., et al., "Environmental Impact Statement for the Greensboro, Guilford County, North Carolina, 201 Wastewater Treatment System (Draft and Final EIS)," Radian Corporation, Austin, TX, September 1977.

WILLIAM M. LITTLE

EDUCATION:

M.S., Civil Engineering, University of California, Berkeley, 1974.

M.S., Hydrology, University of Arizona, Tucson, 1968.

B.S., Hydrology, University of Arizona, Tucson, 1967.

EXPERIENCE:

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Senior Engineer and Group Leader, Radian Corporation, Austin, TX, 1982-Present.

Senior Engineer, Radian Corporation, Austin, TX, 1978-1982.

Hydrologist, U.S. Army Environmental Hygiene Agency, 1973-1978.

Research and Technical Operations Officer, U.S. Army Engineer Nuclear Cratering Group, 1969-1971.

Graduate Student in Research, University of Arizons, Tucson, 1968.

FIELDS OF EXPERIENCE:

Mr. Little is a Senior Engineer and Group Leader with a major technical specialty in ground-water pollution studies. He is currently the Project Director for hydrogeologic investigations of multiple waste disposal sites on Kelly Air Force Base, Texas, and Tinker Air Force Base, Oklahoma. These investigations include monitoring well construction, ground-water sampling, and contaminant transport assessment. He is responsible for program design and execution, subcontractor selection, and managing and editing the final report. He has recently completed a hydrogeologic investigation of a Superfund site in western New York state. The project included monitoring well construction, definition of ground-water flow system, assessment of contaminant transport potential, and presentations to regulatory authorities.

Mr. Little served as Project Director and principal investigator.

He has served as Project Director and field manager for a large, multidisciplinary characterization of an abandoned hazardous waste disposal site in southern California. The waste materials consist of acid petroleum refinery sludges. Major areas of investigation were: chemical characterization of wastes and geologic materials; quantification of sulfur dioxide and hydrocarbon emissions; and ground-water monitoring. Mr. Little was responsible for managing the field operations and supervising report preparation.

Mr. Little has served as assistant Project Director and field manager for an investigation of the ground-water quality impact of a spill of a coal-distillate liquid at an SRC pilot plant near Tacoma, Washington. The study involved

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detailed unsaturated zone coring and designing and constructing a series of ground-water monitoring wells A Remedial Measures Plan was formulated and adopted to remove contaminated materials and to prevent the further spread of ground-water contamination. Following the evaluation of the spill event, Mr. Little directed an expanded program to evaluate the ground-water quality effects of overall plant operations. The possible sources of contamination were identified and characterized. Mr. Little then developed a ground-water monitoring program and supervised the installation of the monitoring network. He designed and conducted squifer pump tests to define aquifer performance and interpreted the results.

Mr. Little has also conducted a program to evaluate the extent of ground-water contamination by refinery operations and wastes at an oil refinery near Duncan, Oklahoma. The initial assessment was based on site reconnaissance, interviews with refinery personnel and a study of existing hydrogeologic and process data.

Mr. Little has recently completed two environmental/regulatory fatal flaw studies for lignite mines and associated power plants in East Texas. He was both Project Director, responsible for overall management and preparation of the final report, and hydrology task leader, responsible for assembling data on hydrologic conditions and assessing probable impacts. He has also recently served as task leader for regulations review, impact analysis and permit application preparation for a commercial-scale coal gasification facility in Wyoming and ground-water hydrology task leader for environmental analysis of a major lignite mine and associated synfuels plant in east Texas.

In another program, Mr. Little directed an evaluation of surface-water and ground-water availability in the vicinity of the proposed Solvent Refined Coal-II (SRC-II) demonstration plant and commercial facilities near Morgantown, West Virginia.

For a private industrial client, Mr. Little reviewed and evaluated the environmental monitoring data from the vicinity of an in situ coal gasification test in the Powder River Basin of Wyoming. The water quality impacts of the test burn were assessed, and a program of aquifer restoration and hydrologic testing recommended. Based on available hydrologic and geochemical data, a conceptual model of the test site was developed. He also developed a ground-water monitoring and contingency aquifer restoration program for a proposed future test. The program includes selection of well locations and parameters for monitoring and specification of restoration strategies.

Mr. Little has also participated in an assessment of the environmental behavior of fluidized bed combustion (FBC) waste for EPA, IERL. Mr. Little was responsible for the design, construction and operation of field cells for testing FBC waste disposal alternatives and for the development of a preliminary waste transport model. He has also been project director and hydrology

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task leader in the evaluation of the environmental suitability of an ash/ scrubber sludge disposal site. He was responsible for the overall management of the program, evaluated the laboratory and hydrogeologic data and predicted contaminant migration.

As a hydrologist with the Water Quality Engineering Division, U.S. Army Environmental Hygiene Agency, Mr. Little served as a consultant to the Office of the Surgeon General and to major commands and installations on hydrologic aspects of water supply and wastewater disposal. He prepared design criteria for programs of effluent and receiving water monitoring at Army manufacturing and research facilities, evaluated ground-water pollution potential of waste disposal practices, and reviewed draft NPDES discharge permits issued to Army installations. He performed preliminary technical feasibility studies of land treatment of wastewater including field investigations and trial systems design. He conducted environmental impact statement data requirements review and prepared and reviewed portions of environmental impact statements. Mr. Little also managed the Army Medical Department's nationwide Drinking Water Surveillance Program.

With the Corps of Engineers, Mr. Little was assigned as a Research and Technical Operations Officer, U.S. Army Engineer Nuclear Cratering Group. There he conducted a general investigation of hydrologic transport of radionuclides from Plowshare application sites. This work included literature searches, computer simulation, experimental design and conceptual modeling of transport phenomena. He also participated in final preparation of a 1971 Corps of Engineers report on Wastewater Management in the San Francisco Bay Region.

While at the University of Arizona, Mr. Little was a member of the Operations Research Study Group on the Tucson Basin, gathering background hydrologic material, and conducting a literature and data file search. He directed and participated in preliminary adaptation of a two-dimensional, finite difference model of a large, heterogeneous ground-water basin.

HONORARY AND PROFESSIONAL SOCIETIES:

American Geophysical Union, American Water Resources Association, National Water Well Association, Sigma Xi.

CERTIFICATION:

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AIPG Certified Professional Geological Scientist No. 6468.

PUBLICATIONS/REPORTS:

Numerous technical reports in the fields of water resources development, ground-water contaminant migration, occurrence of radionuclides in ground water, land treatment feasibility and receiving water monitoring, including:

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Little, W.M., "Hydrogeologic Investigations, Facet Enterprises, Inc., Elmira, New York," Radian Corporation Final Report to Facet Enterprises, Inc., September 1983.

Little, W.M., et al., "McColl Site Investigation - Phase 1," Radian Corporation Report to the Participants Committee, November 1982.

Little, W.M., et al., "Environmental Considerations and Air Quality Modeling for the Freestone County Project," Radian Corporation Report to Tenneco Coal Company, March 1982.

Grimshaw, T.W., et al., "Assessment of Fluidized-Bed Combustion Solid Wastes for Land Disposal," Draft Final Report, Radian Corporation Report to EPA Industrial Environmental Research Laboratory, December 1982.

Little, W.M., et al., "Environmental Considerations and Air Quality Modeling for the Edgewood and Mustang Creek Prospects and Associated Energy Park," Radian Corporation Report to Tenneco Coal Company, November 1981.

Little, W.M., et al., "Ground-Water Impact of SRC Pilot Plant Activities Fort Lewis, Washington," Radian Corporation report to Gulf Mineral Resources Company, January 1981.

Little, W.M., et al., "Ground Water Modeling at an In-Situ Coal Gasification Test," Radian Corporation Report to confidential industrial client, September 1980.

Little, W.M. and H.J. Williamson, "Recommended Ground-Water Monitoring and Aquifer Restoration Programs, Future In-Situ Coal Gasification Test," Radian Corporation Report to confidential industrial client, September 1980.

Little, W.M. and W.C. Micheletti, "Recommended Aquifer Restoration and Hydrologic Testing Program for an In-Situ Coal Gasification Test," Radian Corporation Report to confidential industrial client, August 1980.

Grimshaw, T.W. and W.M. Little, "Remedial Measures Plan for a Spill of Solvent Refined Coal Liquid at the SRC Pilot Plant, Fort Lewis, Washington," Radian Corporation Report to Gulf Mineral Resources Company, August 1980.

Little, W.M., et al., "Hydrologic Evaluation of a Combined Ash/FGD Sludge Storage Site, Craig Station," Radian Corporation Report to Colorado Ute Electric Association, July 1980.

Little, W.M., T.J. Wolterink, and M.H. McCloskey, "Water Availability Appraisal for the Proposed Solvent Refined Coal-II Demonstration Plant, Monongalia County, West Virginia," Radian Corporation Report to U.S. Department of Energy, February 1980.

William M. Little

Little, W.M., "Water Quality Geohydrologic Consultation No. 24-0286-77," Twin Cities Army Ammunition Plant, New Brighton, MN, 21-23 July 1976, U.S. Army Environmental Hygiene Agency, 11 January 1977 (six additional geohydrologic consultations; sole author on two, senior on three, junior on one).

Little, W.M., Drinking Water Consultation Visit No. 24-1301-77, Joliet Army Ammunition Plant, Illinois, 2-4 August 1976, USAEHA, 9 February 1977 (four additional drinking water consultations).

Little, W.M., Water Quality Geohydrologic Consultation No. 24-058-75/76, Land Disposal Feasibility Study, Fort Polk, Louisiana, 2-29 April and 9-29 October 1975, USAEHA, 19 August 1976.

Little, W.M., Water Quality Geohydrologic Consultation No. 24-005-76, Land Disposal Feasibility Study, Fort Dix, New Jersey, 21-30 July and 15-23 September 1975, USAEHA, 18 June 1976 (two additional land treatment evaluations as part of water quality engineering special studies).

Little, W.M., Water Quality Monitoring Consultation No. 24-048-74/75, Aberdeen Proving Ground, Maryland, 25-27 February 1974, USAEHA, 17 December 1974 (three additional monitoring consultations).

Little, W.M., Water Quality Engineering Special Study No. 24-017-74, Mixing in Receiving Waters, 7 September-24 October 1973, USAEHA, 3 January 1974.

Little, W.M., Analysis of Hydrologic Transport of Tritium, U.S. Army Engineer Nuclear Cratering Group Technical Memorandum 70-7, Lawrence Radiation Laboratory, Livermore, CA, April 1971.

Little, W.M., An Engineering and Economic Feasibility Study for Diversion of Central Arizona Project Waters from Alternate Sites, M.S. Thesis, Department of Hydrology, University of Arizona, Tucson, AZ, 1968.

LAWRENCE N. FRENCH

EDUCATION:

M.A., Geological Sciences, University of Texas at Austin, 1979.

B.S., Geological Sciences, University of California at Riverside, 1975.

EXPERIENCE:

Group Leader, Radian Corporation, Austin, TX, 1982-Present.

Staff Geologist, Radian Corporation, Austin, TX, 1979-Present.

Geologist, Sargent and Lundy Engineers, Chicago, IL, 1978-1979.

Teaching Assistant, University of Texas at Austin, 1975-1976.

FIELDS OF EXPERIENCE:

At Radian, Mr. French is involved in a variety of hydrogeologic and geologic studies. His roles in these studies range from collecting and analyzing hydrogeologic data, interpreting and reporting results of investigations, to directing interdisciplinary programs.

Mr. French has been involved in various aspects of ground-water investigations at several hazardous waste disposal sites. He recently served as Project Director for a study of PCB-contaminated soils at an industrial site in North Texas. The study involved sampling and analysis of near-surface soils to define the extent of PCB contamination. Remedial measures options were also identified. Mr. French also developed a ground-water monitoring plan in accordance with the Compliance Agreement between the state and the property owner. As Ground-Water Task Leader, he supervised the installation of monitoring wells at an abandoned petroleum products waste dump in Southern California. This effort involved collection and logging of soil samples and collection of water samples for chemical analysis. He later co-authored a technical report on the occurrence and character of ground water at the site. As Radian's involvement in the investigation continued, Mr. French prepared technical designs and specifications for a permanent, post-remedial action ground-water monitoring network. Mr. French has also been responsible for field activities related to the USAF Installation Restoration Program at Tinker AFB, Oklahoma. At Tinker, electromagnetics surveys were performed at closed industrial waste impoundments and monitoring wells were installed near landfills. At England AFB, Louisiana, Mr. French developed a work plan for the evaluation of waste disposal practices at the base.

As part of a comprehensive hydrogeologic evaluation of a solvent refined coal pilot plant in Washington, Mr. French supervised the installation of water quality monitoring wells and conducted pumping tests for the evaluation of

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aquifer characteristics. He also supervised soil coring and sampling efforts at the site of process fluid spill. Mr. French also served as Project Director for a pre-closure evaluation of two hazardous waste impoundments at a wood treatment plant in Washington. The plant had discharged wastewater containing creosote and pentachlorophenol to the unlined impoundments, which are located on floodplain sands and gravels of the Columbia River. A second site was also examined in terms of disposal practices and the character and volume of wastes. Results of the pre-closure survey were used for a definition of areas of concern requiring closure and for the selection of ground-water monitoring parameters based on the character and volume of wastes.

Mr. French has participated in several ground-water studies for Western coal mining programs. For a large surface mine in New Mexico, he was a principal author of the cumulative hydrologic impat assessment conducted for the Office of Surface Mining. Principal hydrologic concerns for individual mines were identified and compared to predicted hydrologic impacts in order to determine if material damage would result from mining. For a proposed commercial underground coal gasification project, Mr. French was involved in the conceptual design of an aquifer restoration program. Ground water would be withdrawn from the burn cavity, treated at the surface, and reinjected into the coal seam. As Task Leader for both geology and ground-water hydrology tasks for a feasibility study of a proposed lignite gasification facility, Mr. French investigated waste disposal and ground-water supply issues. In addition, Mr. French examined the feasibility of a deep well injection system for the disposal of process wastewaters. This initial evaluation included the identification and characterization of possible injection zones, formation water chemistry, probable injection rates and pressures, and subsurface migration of waste fluids.

As a Project Director on a quick-response effort for the Department of Energy, Division of Fossil Fuel Processing, Mr. French evaluated the water availability for a proposed solvent refined coal demonstration plant in northwestern Kentucky. This project consisted of a comprehensive appraisal of existing and future water supplies, demands, and policies that affect water availability in the vicinity of the demonstration plant.

While employed by Sargent and Lundy Engineers, Mr. French was involved in detailed hydrologic and geologic studies for Preliminary and Final Safety Analysis Reports (PSAR and FSAR) for several nuclear power plants. The PSARs and FSARs involved detailed geologic mapping, inventory of water wells, analysis of subsurface flow, and reviews of regional geologic features. In a study conducted with the Illinois and Indiana Geological Surveys, Mr. French analyzed stratigraphic, structural, and hydrologic features at sites in the Illinois Basin for a compressed air energy storage project. Mr. French directed an extensive hydrogeologic and geologic study of potential sites for a lignite-fired electric generation station in Walker County, Texas. Mr. French also conducted the field program for an engineering soils exploration

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effort at a construction site for a lignite-fired power plant in Harrison County, Texas.

Mr. French supervised several field programs at Sargent and Lundy. These programs included: construction and testing of two industrial water wells near Cincinnati; installation and testing of pneumatic piezometers at a nuclear power plant excavation in northern Indiana; and aquifer testing and analysis of hydraulic characteristics of the alluvial-glacial outwash aquifer near Wausau, Wisconsin.

HONORARY AND PROFESSIONAL SOCIETIES:

American Institute of Professional Geologists, CPGS No. 6307; California Registered Geologist No. 3804; Ground-Water Technology Division of the National Water Well Association; Geological Society of America.

PUBLICATIONS/REPORTS:

French, L.N. and J.L. Machin, "Cumulative Hydrologic Impact Assessment for McKinley Mine," Radian Corporation, Austin, TX, January 1984.

Little, W.M. and L.N. French, "Hydrogeologic Aspects of the McColl Site, Fullerton, California," Radian Corporation, Austin, TX, November 1982.

French, L.N., "Pre-Closure Evaluation of the Treated Wood Products Facility and Site C, Longview, Washington," Radian Corporation, Austin, TX, May 1983.

Lacy, J.C., L.N. French, and T.W. Grimshaw, "Regulation of the Hydrologic Impacts of Underground Coal Gasification," in Proc. Sixth Underground Coal Conversion Symposium, Shangri-La, OK, pp. V-79 thru V-88, July 1980.

French, L.N., et al., "Environmental Constraint Analysis of the Proposed Coastal Bend Coal Gasification Project," Radian Corporation, Austin, TX, August 1981.

White, D.M. and L.N. French, "Evaluation, Screening, and Prioritization of Candidate Gulf Coast Lignite Resource Blocks," Radian Corporation, Austin, TX, April 1981.

French, L.N. and J.L. Machin, "Water Availability Appraisal for the Proposed Solvent Refined Coal-I Demonstration Plant, Daviess County, Kentucky," Radian Corporation, Austin, TX, December 1979.

U.S. Bureau of Land Management, "Proposed Camp Swift Lignite Leasing (Draft and Final EIS)," Radian Corporation, Austin, .TX, September 1980.

Lawrence N. French

French, L.N., "Compilation of Environmental Information for a Proposed Olefins Complex, Brazoria County, Texas," Radian Corporation, Austin, TX, July 1981 (author of Ground-Water Hydrology and Topography and Geology chapters).

Skinner, F.D., L.N. French, and D.E. Pusch, "Regulatory Review and Estimated Costs for a Proposed In-Situ Gasification Facility," Radian Corporation, Austin, TX, April 1982.

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ROBERT C. WALLACE

EDUCATION:

Master of Engineering, Environmental Engineering, (Minor, Coastal and Oceanographic Engineering), University of Florida, Gainesville, FL, 1980.

Graduate Studies in Statistics, Florida State University, Tallahassee, FL, 1977.

B.A., Environmental Science, University of Virginia, Charlottesville, VA, 1971.

EXPERIENCE:

Staff Engineer, Radian Corporation, Austin, TX, 1981-Present.

Environmental Engineer, Radian Corporation, Austin, TX, 1980-1981.

Graduate Research Assistant, Water Resources Research Center, University of Florida, 1977-1980.

Lieutenant, United States Navy, 1971-1976.

FIELDS OF EXPERIENCE:

While at Radian, Mr. Wallace pursues engineering solutions to environmental problems and issues for both private industry and government clients. His experience and training includes both operational management and engineering research and development roles. His primary research interests at Radian include hydrologic investigations, transport processes in natural systems, and evaluation of alternative waste management treatment systems for energy industries.

Mr. Wallace is participating in the preparation of RCRA part B applications for a variety of clients who operate hazardous waste treatment, storage, or disposal facilities. These include two major petroleum refineries, a new hazardous waste incinerator at a major chemical manufacturing facility, and a research and development facility for a new PCB thermal destruction process. Mr. Wallace has been involved in all phases of the requirements for a RCRA permit incuding incinerator and land treatment demonstrations, liner compatibility testing, ground water investigations, and facility management plans.

Mr. Wallace was the project director of a study of wastewater treatment alternatives available to a major Midwest refinery which had been unble to consistently meet its NPDES discharge limitatinos. The study included a survey of the literature and screening of control technologies for

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feasibility and cost considerations. A series of alternatives were developed and the impact of these alternatives in terms of cost and effectiveness evaluated.

At Radian, Mr. Wallace has served as the project director for a number of programs related to the feasibility, environmental acceptability, and permitting strategy for major new energy facilities. This work includes: a stormwater management study for a major oil refinery in the midwest, a feasibility study for a proposed coal gasification plant that included separate studies on site selection, environmental assessment, regulatory analysis, and CPM schedule preparation; several programs to provide all permitting support to proposed natural gas-fired cogeneration power plants to be situated adjacent to major energy or chemical facilities; environmental analysis of noise impacts on nearby communities and wildlife from two large energy plants, one in Kentucky and one in North Texas; hydrologic analysis of the impacts of the discharge of lignite mine depressurization waters to four small creeks in Central Texas; a comparative analysis of the environmental impacts of industrial lignite utilization via direct firing versus medium Btu gasification; a technical review of alternative stormwater management/treatment alternatives for the solvent refined coal (SRC) pilot plant in Fort Lewis, Washington. nd

Mr. Wallace is currently involved in the conduct of environmental surveys of private facilities in support of the risk assessment exercise required by the underwriters of Environmental Impairment Liability Insurance. The survey consists of applicant interviews and facility site visits to assess the level of environmental concern and conduct, particularly in the area of waste handling and disposal practices. Facility surveys have included a hazardous waste treatment and disposal site, a multi-facility metal fabrication manufacturing concern, a diversified high technology corporation, a major airline, and a nuclear power plant construction site.

Mr. Wallace evaluated the air and water environmental impacts of alternative remedial actions proposed for the Superfund clean-up of the Lipari landfill in Pittman, New Jersey. At this site a variety of synthetic organic chemicals were leaching into an urban watershed. In order to predict the fate of individual chemicals, Mr. Wallace employed an environmental fate (Fugacity) model to examine the partitioning behavior of the chemicals leaching into the watercourse and lake downstream from the landfill. This analysis demonstrated that although most of the chemicals were volatile, two substances Bis 2(chloroethyl)ether and Bis 2(chloroethoxy)ethane were soluble enough to be found in the stream and lake downstream.

In Fullerton, California, at the McColl Superfund site, Mr. Wallace evaluated the odor impacts of various alternative clean-up options being considered. In this effort, he exercised a calibrated odor prediction model for evaluating removal options involving site disturbance. This model strongly indicated that even small disturbances of the site (by earth-moving equipment) would produce large odor impacts in nearby residential areas.

As a research assistant at the University of Florida, Mr. Wallace investigated the hydrology of cypress wetlands to assess their potential for use as water management areas for secondary sewage effluent recycling. This long-term study was under the auspices of the Rockefeller Foundation and the RANN Division of the National Science Foundation. His specific research task was to quantify the surface-water budget. This included measurement and analysis of basin geometry; flow rate determination from analysis of level records; and development of a mathematical prediction model for surface outflow.

Mr. Wallace studied under an EPA-funded program to collect from all sources urban rainfall-runoff-quality data for use in modeling and for characterization of urban stormwater runoff. This data base includes records of over a thousand rainstorms from 85 different catchments in urban areas all over North America. In this effort, Mr. Wallace contributed to the design of the data structure and developed the software programs to access, analyze, and display the data. As part of his Master's research project, he examined the relationship between stormwater quality loadings and precipitation characteristics.

While in the Navy, Mr. Wallace was assigned to several service ships of the U.S. Atlantic Fleet that performed a wide range of ocean engineering tasks including diving operations, oil pollution control, ship and aircraft salvage, and search and rescue throughout the Atlantic and Mediterranean.

PUBLICATIONS:

"Statistical Modeling of Water Quality Parameters in Urban Runoff," Master's Project, University of Florida, 1980.

Surface Water in "Cypress Wetlands for Water Management, Recycling, and Conservation," Final Report to National Science Foundation, Center for the Wetlands, University of Florida, 1980.

"Review of Alternative Stormwater Treatment Systems for the Solvent Refined Coal (SRC) Pilot Plant, Fort Lewis, Washington," Technical Memorandum, Radian Corporation, Austin, TX, 1980.

Environmental Noise - in "An Environmental Assessment for a Geothermal Direct Utilization Project in Reno, Nevada," Radian Corporation, Austin, TX, 1980.

Surface Water and Noise - in "Environmental Report: Combustion Engineering/Gulf States Utilities Company Fuel Gas Demonstration Plant, West Lake, Louisiana," Radian Corporation, Austin, TX, September 1981.

"Analysis of the Impacts of Mine Depressurization Discharges from the Milam Mine," Technical Memorandum, Radian Corporation, Austin, TX, March 1982.

"Preliminary Site Screening Studies: Celanese East Texas Project Final Report, for Task 2 and 3," Radian Corporation, Austin, TX, May 1981.

"Air Quality Siting Constraints in Robertson and Shelby Counties, Texas," Technical Memorandum, Radian Corporation, Austin, TX, July 1981.

"Environmental Screening of Candidate Sites in Brazoria, Robertson, and Shelby Counties," Final Report for Tasks 4 and 5, Radian Corporation, Austin, TX, October 1981.

"Regulatory Compliance Schedule for Environmental Licensing of a Coal Gasification Facility in Texas," Final Report for Task 7, Radian Corporation, Austin, TX, October 1981.

Noise in - "Environmental Information Document for a Proposed Lignite Beneficiation Plant Demonstration Project, Robertson County, Texas," Radian Corporation, Austin, TX, May 1981.

"Problems and Issues Related to Surface-Water Quality Regulation," Report to the Department of Energy, Radian Corporation, Austin, TX, July 1981.

Noise and odor Chapters in - "Compilation of Environmental Information for Tri-State Synfuels Project," Radian Corporation, Austin, TX, September 1981.

"Environmental Assessment of Air Quality, Surface Water, and Noise Impacts for the Proposed Milam Mine," Radian Corporation, Austin, TX, July 1982.

Surface Water Controls in - "Evaluating Cost-Effectiveness of Remedial Actions at Uncontrolled Hazardous Waste Sites," Draft Methodology Manual, Radian Corporation, Austin, TX, January 1983.

Surface Water and Air Ouality in - "Draft Environmental Information Document for Remedial Actions at the Lipari Landfill, Pitman, New Jersey," Radian Corporation, Austin, TX, October 1982.

Environmental Fate in - "Development of a Monitoring Program to Evaluate the Effect of Remedial Actions at the Lipari Landfill on Alcyon Lake, Pitman, New Jersey," Radian Corporation, Austin, TX, January 1983.

"Interim Task Report: Noise and Odor, Texas Gasification Project," Technical Report, Radian Corporation, Austin, TX, January 1983.

Closure, Contingency, and Training Plans in - "Hazardous Waste Incinerator, Industrial Hazardous Waste Part B Permit Application," Radian Corporation, Austin, TX, January 1983.

"Audible Noise Measurements from an Electric Transmission Line near Weimar, Texas," Technical Note, Radian Corporation, Austin, TX, March 1982.

"Noise Assessment for a Proposed Snack Food Manufacturing Facility in Kern County, California," Radian Corporation, Austin, TX, October 1982.

Surface Water in - "Site Evaluation and Regional Screening Analysis for the Tuloma Waste Management Facility," Radian Corporation, Austin, TX, February 1982.

PRESENTATIONS:

"Gasification vs. Direct Firing of Lignite: An Environmental Comparison," Paper presented at American Water Resources Association Symposium on Water for Energy, Houston, TX, December 1980.

"Permitting of a Hazardous Waste Incineration Facility in Northern California," Presentation to the Peninsula Industrial and Business Association Symposium on Practical Alternatives to the Land Disposal of Hazardous Wastes, Palo Alto, CA, June 1982.

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DAVID H. GANCARZ

EDUCATION:

Master of Engineering, Environmental Engineering (Hydrology), University of Florida, Gainesville, FL, 1984.

Bachelor of Arts, Grinnell College, Grinnell, IA, 1976.

EXPERIENCE:

Engineer, Radian Corporation, Austin, TX, 1984-Present.

Graduate Research Assistant, Department of Environmental Engineering, University of Florida, Gainesville, FL, 1983-1984.

Chemist I, Department of Food Science & Human Nutrition, University of Florida, Gainesville, FL, 1981-1982.

Laboratory Technologist I, Department of Soil Science and Department of Fruit Crops, University of Florida, Gainesville, FL, 1977-1981.

Graduate Teaching Assistant, Department of Botany, University of Florida, Gainesville, FL, 1976-1977.

FIELDS OF EXPERIENCE:

As an Engineer at Radian, Mr. Gancarz has been involved with the final preparation of an atmospheric modeling study for the EPA using STRATOS. Mathematical manipulations of the model output as well as graphical presentation were performed on the IBM PC using Lotus 1-2-3.

As a Graduate Research Assistant, Mr. Gancarz was responsible for researching and writing a thorough literature review of the sources, effects, and regulations concerning ambient air flourides for the Florida Department of Environmental Regulation. A later project under the South West Florida Water Management District involved a study of the surface and subsurface hydrology around a 150 MGD wellfield in central Florida. The focus of the project was a modeling effort using the hydrologic models HSPF and PLASM.

His graduate research was an adaptation of the Storage/Treatment block of the widely used urban stormwater runoff model SWMM to microcomputer. A consequence of this research is proficiency with MS DOS, Apple DOS, Apple PASCAL, CP/M, and the FORTRAN compilers F-80 by Microsoft and IBM PC FORTRAN by Microsoft.

Prior to his return to graduate school, Mr. Gancarz conducted analyses of pesticide residues in soil and tissue samples for the Institute of Food and Agricultural Sciences at the University of Florida. Various phases of this

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David H. Gancarz

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work involved sample preparation, gas chromatographic analysis, and radioisotope tracer techniques. While at the Department of Fruit Crops at the University of Florida, Mr. Gancarz developed an efficient assay for cellulase isozymes in citrus.

PUBLICATIONS:

Gancarz, D.H. and W.C. Huber, "The USEPA Storm Water Management Model Storage/Treatment Block for the IBM Personal Computer," Paper to be presented at the Storm Water & Water Quality Model Users Group Conference, Hamilton, Ontario, Canada, 1984 (in preparation).

Gancarz, D.H., et al., "Ambient Atmospheric Fluoride Pollution in Florida," Report to State of Florida Department of Environmental Regulation, 1983.

Huber, W.C., D.H. Gancarz, and R.E. Dickinson, "Apple SWMM, a Possibility?" Proceedings of Conference on Emerging Computer Techniques in Stormwater Management, Ontario, Canada, 1983.

Ou, L.T., et al., "Infuence of Soil Temperature and Soil Moisture on Degradation and Metabolism of Carbofuran in Soils," <u>Journal of Environmental Quality</u>, 11:293-298, 1982.

NANCY PACHARZINA STEIN

EDUCATION:

B.S., Engineering Science/Environmental Engineering, University of Texas at Austin, 1979.

EXPERIENCE:

Environmental Engineer, Radian Corporation, Austin, TX, 1979-Present.

FIELDS OF EXPERIENCE:

As an environmental engineer at Radian, Ms. Stein has performed several wastewater, solid/hazardous waste, and hydrology related studies.

At present, Ms. Stein is working on several projects including an evaluation of treated wastewater from a gasification facility for use as cooling water. As task leader on this project, Ms. Stein coordinated laboratory bench-scale cooling tower tests and was responsible for data reduction and analysis. These data will subsequently be used to verify Radian's predictive cooling tower computer model.

In addition to the cooling tower study, Ms. Stein is also coordinating a project to characterize the Biotechnology Industry in terms of major processes and products and to identify and characterize the waste streams associated with this industry.

Ms. Stein served as Project Director in the conduct of a laboratory biological treatability study of contaminated leachate from a superfund site in New Jersey. Specific issues addressed in this study include: bioaccumulation of contaminants in the waste sludge, release of volatile organics over the aeration basin, and overall treatment performance for the pollutants of concern. As project director for this study, Ms. Stein's role included development of the test plan, monitoring laboratory operations, data reduction and analysis, and overall project management.

For the Environmental Protection Agency, Ms. Stein recently participated on a project to perform a cost-effectiveness evaluation of various remedial action alternatives for a superfund site in New Jersey. Her primary role on this project was to assess various alternatives for treatment of contaminated ground water at the site. Specifically, Ms. Stein identified treatment alternatives, developed the design criteria for each, and provided cost estimates for leachate treatment.

For a related project, Ms. Stein is participating in an effort to prepare a guidance document which can be used by EPA and state regulatory personnel in developing remedial action plans and/or evaluating the factors affecting reliability and cost-effectiveness. Her task on this project is to develop

Nancy Pacharzina Stein

remedial action data summaries for biological and in-situ waste treatment technologies. Items to be addressed for each technology include applicability, limitations, performance, reliability, safety considerations, and development of a design basis to derive cost estimates.

For a major industrial client, Ms. Stein participated in a project to evaluate remedial action alternatives for the clean-up of wood processing waste ponds. Specifically, Ms. Stein identified appropriate technologies for treatment of both the sludges and liquid wastes and assessed the expected performance of each. Future work on this project will involve development of plans and specifications for the selected alternative and management of implementation.

For a major synfuels syndicate, Ms. Stein participated in the development of a test plan for a bench-scale biological treatment study of coal gasification process wastewaters. Based on the characterization of the wastewater, Ms. Stein derived the appropriate operational parameters and was responsible for monitoring the reactors through the acclimation phase.

For EPA's Effluent Guidelines Division, Ms. Stein served as Task Leader in the Development of Effluent Limitations Guidelines and Standards for the Aluminum Forming Point Source Category. During the project Ms. Stein interfaced with both EPA and representatives from the industrial s ctor. Major activities on this project included responding to comments on the proposed regulation and planning and conducting plant sampling trips in response to industry comments.

On a major contract for EPA's Office of Solid Waste, Ms. Stein prepared an engineering analysis of High Density Polyethylene (HDPE) production processes. This effort included identifying the major production processes for HDPE, identification and characterization of waste streams from these processes, and development of material balances for each process. The purpose of this analysis was to identify waste streams for potential listing as hazardous waste under RCRA.

For the Laramie Energy Technology Center (LETC), Ms. Stein served as task leader on a project to develop a Hazardous Waste Management Plan (HWMP) and Employee Training Seminar. Her role on this project included critical evaluation of waste handling procedures, development of the HWMP and Training Program, as well as presentation of the training seminar to LETC personel.

On another project for LETC, Ms. Stein participated in a project to inventory and sample potentially hazardous waste at a Department of Energy (DOE) facility. This project involved participating in the actual sampling program, classification of the wastes under RCRA, and development of subsequent disposal alternatives.

Ms. Stein also provided technical assistance to the Environmental Protection Agency (EPA) on the development of Pollution Control Technical Manuals for the synfuels industry. Her role in this project involved characterization of

Nancy Pacharzina Stein

process effluents and the evaluation of biological treatment performance. Additionally, Ms. Stein assisted in the development of a performance and cost model of biological treatment for cosl gasification wastewaters.

For a major industrial client, Ms. Stein recently performed a study on the characterization of BIOX sludge from gasification wastewater treatment. This project involved wastewater characterization, a quantitative assessment of BIOX performance, and a determination of trace metal concentrations in the BIOX sludge.

Ms. Stein participated in a study of stormwater runoff treatment for a pilot-scale SRC-II plant. Her role on this project consisted of assessing the quality of coal pile and general plant area runoff to be treated.

For a generic study of the environmental residuals and resource requirements associated with gasification of lignite in Texas, Ms. Stein provided technical input in the areas of water resources and wastewater and solid waste residuals. On this project, Ms. Stein as also responsible for management of the project team.

Ms. Stein was responsible for evaluation of surface coal mining wastewater treatability studies in support of an EPA contract to develop effluent guidelines for the Energy and Mining Point Source Category. This project involved a critical evaluation of the methods used during the studies as well as analysis of the data generated.

Ms. Stein has performed numerous surface—water hydrology site assessments for both government and industrial clients. These projects typically involve a complete characterization of baseline conditions and quantitative assessment of potential impacts to surface waters by the proposed action.

JILL P. ROSSI

EDUCATION:

B.A. Geography, The University of Minnesota at Minneapolis, 1972.

EXPERIENCE:

Geographer, Cartographer, Policy and Environmental Analysis Division, Radian Corporation, Austin, TX, 1980-Present.

Drafting and Graphics Assistant, Dam Safety Unit, Texas Department of Water Resources, Austin, TX, 1979-1980.

Cartographer, Continental Map Inc., Austin, TX, 1978-1979.

Teaching Assistant, University College-Geology, University of Minnesota at Minneapolis, 1972.

FIELDS OF EXPERIENCE:

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At Radian, Ms. Rossi is responsible for producing maps and coordinating graphics for the Policy and Environmental Analysis Division. She utilizes data from a variety of technical disciplines (geology, hydrology, noise and air monitoring, sociology, soils, and hydrogeology) to create maps which clearly and concisely illustrate the written text. Ms. Rossi has been responsible for work in the following projects:

- o Develop base maps and coordinate graphics throughout an Environmental Impact Statement prepared for the U.S. Bureau of Land Management for a central Texas lignite mine;
- Develop color overlay method of mapping for site selection process of commercial waste disposal sites in Texas and southeastern Oklahoma;
- o Develop a series of figures used as illustrations in a manual for the Environmental Protection Agency on Remedial Actions at Uncontrolled Hazardous Waste Sites:
- o Draft maps and coordinate the graphics for an Environmental Impact Statement for a synfuels plant in Tennessee;
- o Create base and thematic maps for Air Force Installation Restoration Programs (Phase I and Phase II) for the following locations: Kelly AFB, Texas; Hill AFB, Utah; Bergstrom AFB, Texas; Cannon AFB, New Mexico; England AFB, Louisiana; Tinker AFB, Oklahoma; and Reese AFB, Texas;

Jill P. Rossi

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- o Map limestone deposits, lime plants, and limestone quarries in the United States by county in a series of regional maps for the Electric Power Research Institute;
- o Map compliance/non-compliance with air pollution standards for counties in the United States in a series of EPA regional maps;
- o Map concentrations of selected air pollutants in the El Paso, Texas, area or a Texas Air Control Board study in a series of quarterly and annual reports;
- o Prepare aerial photography history of a wood preserving plant for a commercial client which included extensive research of available aerial photography and interpretation of those photos to determine historical features of interest;
- o Prepare complex permitting schedules for proposed mines, energy facilities, and hazardous waste handling sites;
- o Preparation of base and thematic maps for various feasibility studies, fatal flaw analyses, Environmental Information Documents, and Environmental Impact Statements; and
- Research of available map resources, aerial photography, remote sensing products, and mapping technologies as required by individual client needs.

While with the Texas Department of Water Resources, Ms. Rossi worked in the graphics section of the Dam Safety Unit, a federal grant program. She prepared maps and exhibits, and laid out phototypset text into camera-ready form according to standards, developed with her assistance, for the technical reports written by the engineering section.

During her employment with Continental Map Incorporated, Ms. Rossi was involved in all phases of four color map production. These included source information procurement and classification, imaging base maps, scribing plates, cutting specialties, sizing and adhering type, designing customer copy panels, indexing streets and points of interest, photo-lab contact reproduction of base plates, and the final compositing of the four negative plates to be sent to the printer. These maps included large metroplex areas, counties, enlarged downtown sections, and simplified principle city thoroughfares.

While employed by the University of Minnesota as a Geology Teaching Assistant, Ms. Rossi taught geology laboratory sessions, prepared geology lab work materials, tutored students, and assisted the professors by preparing classroom presentations and grading and proctoring exams.



ANN E. ST. CLAIR

EDUCATION:

M.A., Geological Sciences, The University of Texas at Austin, 1979.

B.A., Geology, Trinity University, 1973.

EXPERIENCE:

Department Head, Radian Corporation, Austin, TX, 1982-Present.

Group Leader, Radian Corporation, 1979-1982.

Senior Geologist, Radian Corporation, 1980-Present.

Staff Geologist, Radian Corporation, 1978-1980.

Research Scientist Associate, The University of Texas at Austin, Bureau of Economic Geology, 1975-1978.

Research Scientist Assistant, The University of Texas at Austin, Bureau of Economic Geology, 1973-1975.

FIELDS OF EXPERIENCE:

At Radian, Ms. St. Clair has had extensive experience in studies relating to ground-water geology, waste disposal, and environmental impacts. Her work has included acquisition of data on ground water, assessment of water quality impacts, and compilation and interpretation of geologic data including geophysical and core logs, and evaluation of impacts of waste disposal and other activities. In hazardous waste studies her work has also involved evaluation of remedial action alternatives and interface with engineers, chemists and other specialists regarding various aspects of hazardous waste investigations including engineering design and cost of remedial action, control of emissions and odors, and waste characteristics. As Department Head at Radian Ms. St. Clair supervises the work of geologists, hydrologists, and ecologists and has management and technical review responsibility for programs in these technical areas.

Ms. St. Clair was Project Director for the second phase of a continuing study at the McColl hazardous waste site in the Los Angeles area. In this phase, data collected in Radian's Phase I field investigation of the site were evaluated and used in the selection and design of the remedial action plan for the site. The site, which is located adjacent to a residential and recreational area, contains various hydrocarbon wastes, principally acidic refinery sludges and drilling muds. Control of volatile emissions, odors, and the potential for contamination of surface water and ground water were addressed in the

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remedial action design. The design must meet strict criteria regarding exposure to contaminants both during remedial action implementation and over the long term.

Ms. St. Clair has major responsibility for studies being performed at several uncontrolled hazardous waste sites, including sites identified as priority sites for remedial action under Superfund. She was Project Director for the first phase of a study to evaluate ground-water conditions at a Superfund site in up-state New York which was used for disposal of wastes from a metal plating operation. The study included installation of monitor wells and test borings and collection of soil and ground-water samples in order to define the presence or extent of subsurface contamination. Based on the results of the field investigation, recommendations for further study or remedial action were developed. During the course of this program, Ms. St. Clair has been involved in initial site evaluation and data collection, development of a site field program, and interface with state and federal regulatory agencies.

Ms. St. Clair has had overall technical responsibility for a variety of activities for the EPA Solid and Hazardous Waste Research Division. These studies, generally involving technical support of Superfund activities, have included a field geophysical survey, treatability studies, column absorption/desorption studies, hydrogeologic evaluations, review of feasibility studies, and evaluation of remedial action technologies for approximately ten Superfund sites.

Ms. St. Clair's role included project management, technical supervision and review, and agency coordination.

For the Lipari landfill Superfund site near Pitman, New Jersey, Ms. St. Clair was responsible for coordinating a variety of technical activities as support to EPA Region II. The site contains a variety of industrial wastes, of which several volatile organic chemicals known to be extremely hazardous are of primary concern. Leachate seeps enter surface streams adjacent to the site and have resulted in a ban on fishing and boating in a lake 1000 feet downstream. Ms. St. Clair had overall responsibility for coordinating the following activities at this site—cost-effectiveness evaluation of 32 remedial action alternatives, preparation of an Environmental Information Document assessing the environmental impacts of remedial action alternatives, definition of baseline conditions and design of a long-term monitoring program on the lake, and a treatability study of the landfill leachate. For all these activities Ms. St. Clair was the principal interface with EPA and had primary technical review and management responsibility.

In a study for the EPA Municipal Environmental Research Laboratory, Ms. St. Clair supervised development of a methodology for conducting evaluations of cost-effectiveness of remedial actions at uncontrolled hazardous waste sites. Under the Comprehensive Environmental Response, Compensation and Liability Act (Superfund), remedial actions conducted at Superfund sites must be demonstrated to be cost-effective. The study involved review of technical and cost

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data on remedial technologies, evaluation of methodologies for cost-effectiveness and related types of analyis, assessment of impacts of time and discount rates on the evaluation, and development of the analytical framework and guidance manual to be used by decision makers in selecting remedial measures.

Ms. St. Clair has participated in Radian's activities related to collection of insurance underwriting information for Environmental Impairment Liability (EIL) Insurance. She worked closely with Radian's parent company, Hartford Steam Boiler Inspection and Insurance Company (HSB) in developing procedures for collection of technical and engineering underwriting information and functions in a Quality Assurance role by reviewing results of all Radian investigations of this type. In 1981 Ms. St. Clair was Project Director for a risk assessment of three power plants in the Boston area. The study involved brief site visits and review of corporate and regulatory agency files in order to assess the potential for gradual environmental impairment as a result of plant activities. The study included assessment of ground-water conditions, waste management practices, hazardousness of materials used on-site, population-atrisk, and corporate approach to environmental matters. A report was prepared containing information for use in underwriting Environmental Impairment (EIL) Insurance.

During 1981, Ms. St. Clair was Project Director for a large program to develop a waste management strategy for the Wyoming Coal Gasification Project. The program involved chemical and physical analysis and regulatory classification of power plant and gasification wastes and organic by-products. Based on the results of the testing, recommendations were made for treatment and disposal of wastes to meet applicable regulatory requirements. In addition, the study included column leaching studies to assess impacts of mine disposal of plant wastes, evaluation of ground water impact of disposal facilities at the plant site, and preparation of applicable state and federal permit applications.

In 1980-1981, Ms. St. Clair was Project Director for a program to evaluate waste disposal practices and ground-water conditions at a large petroleum refinery in Kenai, Alaska. The study focused on development of a long-term waste management strategy for disposal of refinery wastes, principally API separator bottoms and crude tank bottoms, which have been designated as hazardous wastes under RCRA. Initially Ms. St. Clair supervised design, installation and sampling of ground-water monitoring wells in the vicinity of existing disposal sites in order to assess the water-quality impacts of past disposal practices. Samples of all refinery waste streams and wastes from existing pits were characterized for the purpose of developing a plan for closure of existing pits and an ultimate waste management plan. Options were evaluated with respect to technical feasibility (particularly in light of climatic factors), environmental acceptability, regulatory compliance, and economics.

In 1979, Ms. St. Clair was Project Director for an investigation of soil/ground-water contamination and remedial action at a pesticide formulation

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facility in north Texas. The study was aimed at evaluating possible contamination from underground waste storage tanks suspected of leaking. Ms. St. Clair initially conducted sampling of soils in the vicinity of the tanks to determine if leakage had occurred. She also designed and supervised installation of a network of ground-water monitoring wells in order to evaluate ground-water flow at the site and to assess water-quality impacts of the suspected leakage. During drilling, core samples were taken in both the unsaturated and saturated zone for chemical analysis. Ms. St. Clair performed slug tests on the wells to provide data on aquifer properties. She also supervised infiltration tests in order to evaluate the surface infiltration conditions and to qualitatively assess the potential for leachate generation. Based upon the results of this study, recommendations were made for further studies and possible remedial actions.

In a study to determine impacts of a product spill at a Solvent Refined Coal-II demonstration plant in Fort Lewis, Washington, Ms. St. Clair was responsible for portions of the ground-water evaluation, including installation of monitoring wells, measurements of water levels, and interpretation of hydrologic and chemical data. She was also involved in interfacing with state regulatory agencies.

Ms. St. Clair was Project Director of a study for EPA Region III, evaluating the suitability of land around the Cheswick Power Station near Pittsburgh, Pennsylvania, for disposal of coal ash and scrubber sludge. The study was conducted as technical support for enforcement actions brought by EPA Region III concerning alleged violations of air emissions regulations from the coal-fired power plant. In the event that installation of SO₂ scrubbers was to be required by EPA, this study was underaken to document the availability of land for disposal of wastes from the scrubbers. During the study, Ms. St. Clair supervised a multidisciplinary team evaluating the hydrogeology, transportation, land use, ecology, and economic factors affecting the acceptability of sites in the vicinity of the plant for disposal of wastes.

In a study for EPA Region VII, Ms. St. Clair supervised several programs concerned with suitability of soils for septic tanks and nitrate contamination of ground water in Missouri. Ms. St. Clair supervised technical efforts on three programs. One program involved detailed soils mapping and field examination of septic tank failures in Greene County, Missouri, and in order to develop a septic-tank suitability map. Another study focused on determination of any relationships between water well construction practices and occurrence of ground water contamination in Howell County, Missouri. It involved a field survey for sampling of ground water and for obtaining information on well construction. A third program was conducted to develop a regional map of nitrate concentrations in ground water in the four-state area of EPA Region VII. In addition to development of technical reports for each of these studies, reports were prepared for lay readers.

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Ms. St. Clair was Project Director for a feasibility and site selection study for an in-situ gasification project utilizing Texas lignite. The study focused on evaluation of environmental factors that might affect project feasibility. Ms. St. Clair was involved in overall project coordination as well as studies related to environmental and hydrologic conditions at several candidate sites.

As a research associate at the Bureau of Economic Geology, Ms. St. Clair was involved in numerous studies requiring collection and interpretation of geologic data, sampling and chemical analysis of ground water, and evaluation of environmental and engineering impacts of man's activities. She was responsible for the preparation of maps, technical reports, and presentations, as a part of these programs.

PROFESSIONAL/TECHNICAL SOCIETIES:

American Institute of Profession Geological Scientists, Certified Professional Geological Scientist 4741; National Water Well Association, Ground Water Technology Division; Geological Society of America; Austin Geological Society.

PUBLICATIONS:

Radian Corporation, "Cost-Effectiveness Evaluation of Remedial Action Alternatives for the McColl Site, Fullerton, California," Final Report, June 1983.

Radian Corporation, "Environmental Assessment of the Remedial Action Alternatives for the McColl Site, Fullerton, California," Final Report, June 1983.

Radian Corporation, "Evaluating Cost-Effectiveness of Remedial Action at Uncontrolled Hazardous Waste Sites," Draft Methodology Manual, January 1983.

St. Clair, A.E., M.H. McCloskey, and J.S. Sherman, "Development of a Framework for Evaluating Cost-Effectiveness of Remedial Actions at Uncontrolled Hazardous Waste Sites," Proceedings, Third National Conference on Management at Uncontrolled Hazardous Waste Sites, Washington, DC, December 1982.

Radian Corporation, "Draft Environmental Information Document for Remedial Actions at the Lipari Landfill, Pitman, New Jersey," July 1982.

Radian Corporation, "Cost-Effectiveness Assessment of Remedial Action Alternatives, Lipari Landfill," Revised Draft Report, June 1982.

St. Clair, A.E., et al., "Environmental Compliance Review and Risk Assessment for Selected New England Electric System Power Stations," Final Report, December 1981.

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Section between

Radian Corporation, "Preliminary Conceptual Plan for Solid Waste Management at the Wyoming Coal Gasification Project," submitted to WyCoalGas, Inc., February 1981.

Radian Corporation, "Results of Waste Analyses and Preliminary Recommendation of a Waste Management Strategy at Tesoro Alaska's Kenai Refinery," December 1980.

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George, F.M., et al., "Assessment of Gulf Coast Lignite Marketability," Final Report, August 1980.

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St. Clair, A.E., et al., "Preliminary Fatal Flaw Analysis for Siting a Gasification Plant in Panola County, Texas," May 1980.

St. Clair, A.E., et al., "An Investigation of Potential Soil/Ground-Water Contamination at a Pesticide Formulation Facility in North Texas, Phase II," Draft Report, April 1980.

St. Clair, A.E. and J.L. Parr, "A Preliminary Investigation of Potential Soil/Ground-Water Contamination at a Pesticide Formulation Facility in North Texas," Phase I Final Report, October 1979.

Radian Corporation, "Preliminary Environmental Assessment for a Proposed Olefins Complex, Brazoria County, Texas," August 1979.

Grimshaw, T.W., J.L. Machin, J.R. Mase, A.E. St. Clair, and F.H. Sheffield, "Hydrology Related Regulatory Risks for Lignite Mining at a Prospect in Eastern Texas and Western Louisiana," July 1979.

Garner, L.E., A.E. St. Clair, and T.J. Evans, "Mineral Resources of Texas (map)," Bureau of Economic Geology, University of Texas, Austin, 1979.

St. Clair, A.E., "Mineral Lands in the City of Dallas: Bureau of Economic Geology," University of Texas, Austin, Geological Circular 78-1, 1978.

St. Clair, A.E., T.J. Evans, and L.E. Garner, "Energy Resources of Texas (map)," Bureau of Economic Geology, University of Texas Austin, scale 1:1,000,000, 1976.

Ann E. St. Clair

St. Clair, A.E., C.V. Proctor, W.L. Fisher, C.W. Kreitler, and J.H. McGowen, "Land and Water Resources, Houston-Galveston Area Council," Bureau of Economic Geology, University of Texas, Austin, Land Resources Laboratory Map Series, 25 p., 4 maps, scale 1:125,000, 1975.



APPENDIX L
Geophysical Tracings



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Specifications of Ground Conductivity Meters Utilized for Geophysical Surveys (from manufacturer's literature, Geonics, Ltd.)

ONE MAN **CONTINUOUS READING**



EM31

effective death of explaration is approximately six meters making it ideal for preaming geographics. By elementing ground contact: measurements are easily need out in regions of this resistancy such as graves operations and besteck or a uniform hart space the ENST reads identically with conventional resistanch ng the measurement is analogous to a conveni with a hised array spacing interpretation curver then permit an estimate of a layered earth E conventioned galvanic resistantly surve on curves supplied with each instrumen

The advantages of the ENGS are the speed with which surveys can be carried out the ability to precisely measure shall changes in conductivity, and the committee readful which prevides a previously undetainable lateral resolution.

Specifications

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SEMBOR

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OPERATING FREQUENCY 9.8 MHZ POWER SUPPLY 8 disper

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CONDUCTIVITY RANGES 3, 10 30, 100, 300, 1000 mmn

MEASUREMENT PRECISION : 2% of full scale MEASUREMENT ACCURACY :5% at 20 minus

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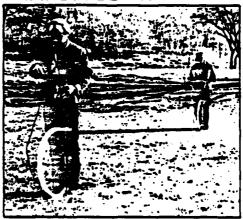
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1 4 meters stored
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Shoping Crate 155 = 42 = 28 cm

Instrument Weight 9 light Sheping Weight 23 light

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Single operation survey speed and straight forward data interpretation in EM34-3 a versable and cost effective tool for the engineering geographicss.

Specifications

MEASURED QUARTITY ADD

PRIMARY FIELD SOURCE Set con

REFERENCE CABLE Ligh

INTERCOIL SPACING & 010 meters at 6 4 and GPERATING FREQUENCY #20 meters at 1 6 kHz

POWER SUPPLY

Transmitter & disposable (7 certs Receiver & disposable C7 certs

CONDUCTIVITY RANGES 3 10 30 100 300 mmm MEASUREMENT PRECISION : 2% of hat scale deflection

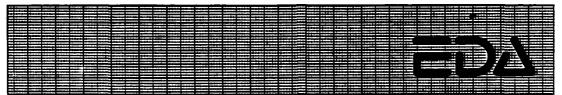
MEASUREMENT ACCURACY : 5% at 20 minimus per me NOISE LEVEL < 0.2 minimas per meter

Receiver Console 19 5 x 13 2 x 28cm
Transminer Console 15 x 8 x 26cm
Colls 53cm diameter DIMENSIONS

Receiver Console 3 1 kg Receiver Cos 3 2 kg Transmitter Console 3 0 kg

WEIGHTS

SPECIFICATIONS OF MAGNETOMETER UTILIZED FOR GEOPHYSICAL SURVEYS (From Manufacturer's Literature, EDA Instruments, Inc.)



Specifications

Dynamic Range

Tuning Method

18,000 to 110,000 gammas. Roll-over display feature suppresses first significant digit upon exceeding 100,000

value

Tuning value is calculated accurately utilizing a specially developed tuning algorithm

Automatic Fine Tuning

± 15% relative to ambient field strength of last stored

Display Resolution Probessing Sensitivity 0.1 camma + 0.02 gamma 0.01 gamma

Statistical Error Resolution Absolute Accuracy

± 1 gamma at 50,000 gammas at 23°C ± 2 gamma over total temperature range

Standard Memory Capacity Total Field or Gradient Tie-Line Points Base Station

1,200 data blocks or sets of readings 100 data blocks or sets of readings 5,000 data blocks or sets of readings

Display

Custom-designed, ruggedized liquid crystal display with an operating temperature range from -40°C to +55°C. The display contains six numeric cligits, decimal point, battery status monitor, signal decay rate and signal amplitude monitor and function descriptors.

RS 232 Serial I/O Interface **Gradient Tolerance** Test Mode

2400 baud, 8 data bits, 2 stop bits, no parity 6,000 gammas per meter (field proven)

Sensor

A. Diagnostic testing (data and programmable memory) B. Self Test (hardware)

Gradient Sensors

Optimized miniature design. Magnetic cleanliness is consistent with the specified absolute accuracy. 0.5 meter sensor separation (standard), normalized to gammas/meter. Optional 1.0 meter sensor separation available. Horizontal sensors optional.

Sensor Cable

Remains flexible in temperature range specified, includes strain-relief connector

Cycling Time (Base Station Mode)

Programmable from 5 seconds up to 60 minutes in 1 second increments

Operating Environmental Range

-40°C to +55°C; 0-100% relative humidity; weatherproof

Power Supply

Non-magnetic rechargeable sealed lead-acid battery cartridge or beit; rechargeable NICad or Disposable battery cartridge or beit; or 12V DC power source option for base station operation.

Battery Cartridge/Belt Life

2,000 to 5,000 readings, for sealed lead acid power supply, depending upon ambient temperature and rate of readings

Weights and Dimensions

Instrument Console Only NiCad or Alkaline Battery Cartridge NICad or Alkaline Battery Belt Lead-Acid Battery Cartridge Lead-Acid Battery Belt

1,2 kg, 235 x 105 x 90mm 1.2 kg, 540 x 100 x 40mm 1.8 kg, 235 x 105 x 90mm 1.8 kg, 540 x 100 x 40mm

2.8 kg, 238 x 150 x 250mm

Sensor

Gradient Sensor 10.5 m separation - standard)

1.2 kg, 56mm diameter x 200mm 2.1 kg, 56mm diameter x 790mm

Gradient Sensor (1.0 m separation - optional)

2.2 kg, 56mm diameter x 1300mm

Standard System Complement

Instrument console; sensor; 3-meter cable, aluminum sectional sensor staff, power supply, harness assembly,

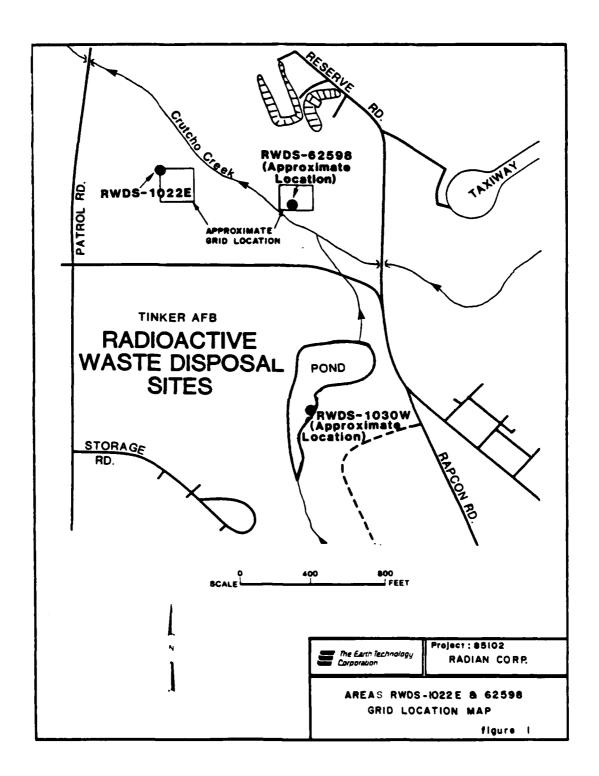
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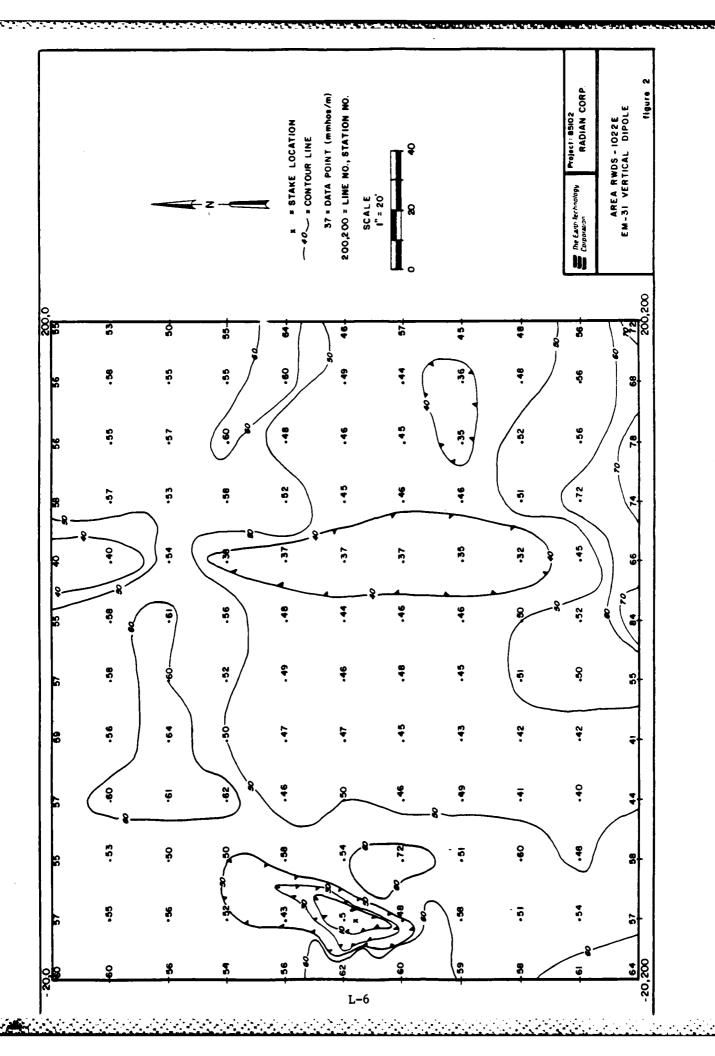
Standard system # Standard system 100.5 meter sensor

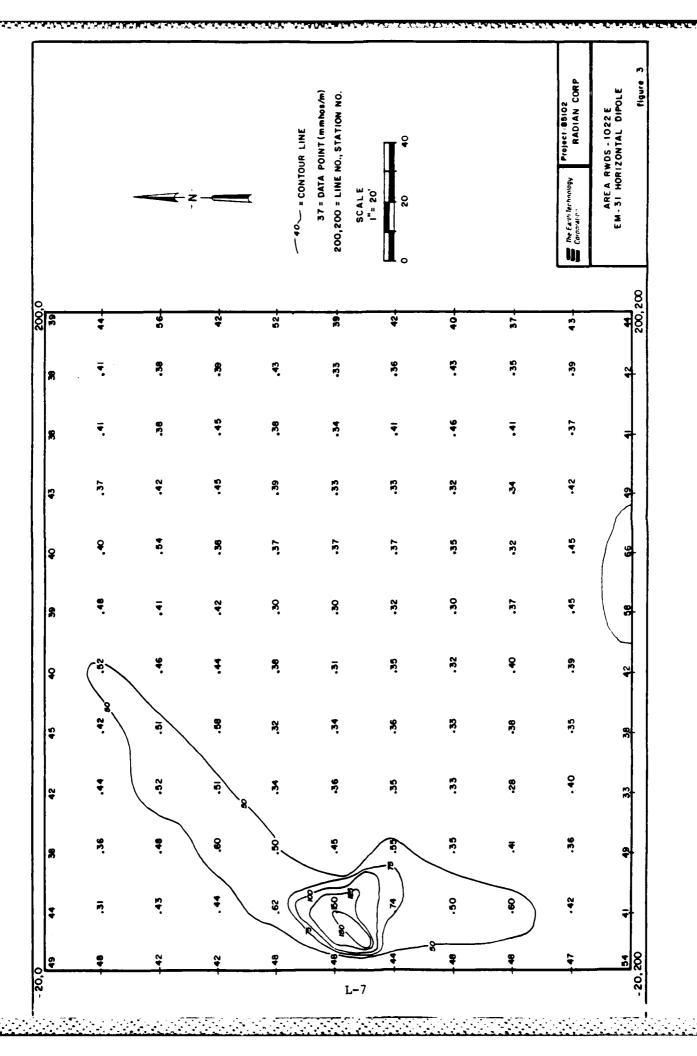
Base Station Option Gradiometer Option E D A Instruments Inc 4 Thorncliffe Park Drive Toronto Ontario Canada MdH 1H1 Telev 06 23222 EDA TOR Cable instruments Toronto (416) 425 7800

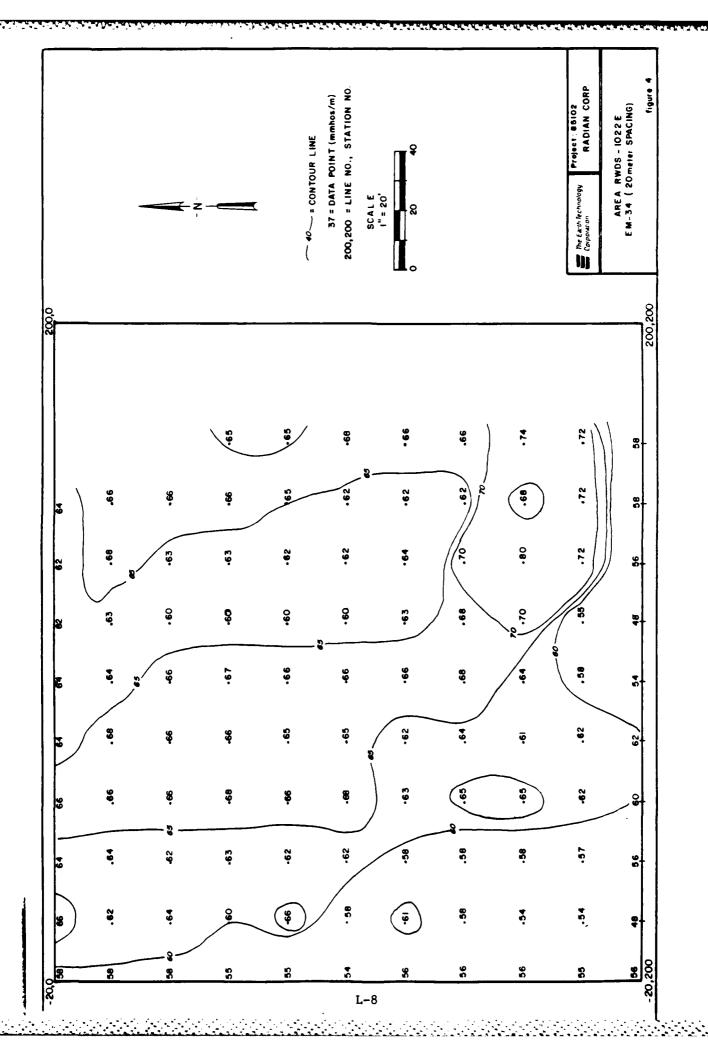
in U.S.A. E.D.A. instruments inc. 5151 Ward Road Wheat Ridge Colorado U.S.A. 30033 3031 422 9112

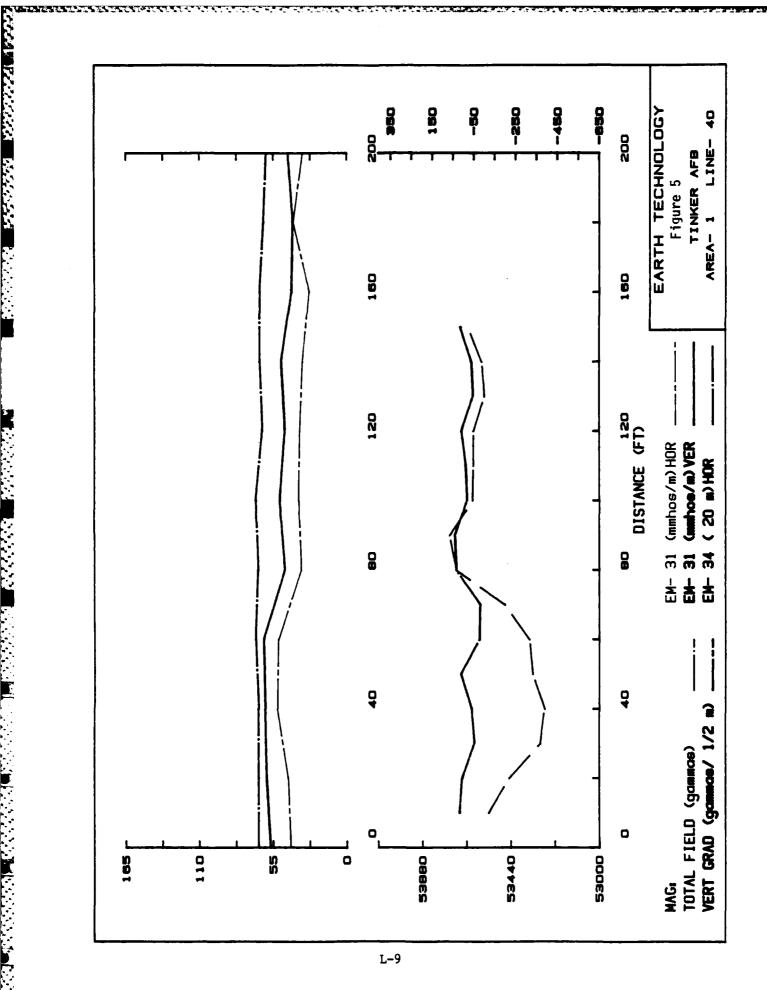
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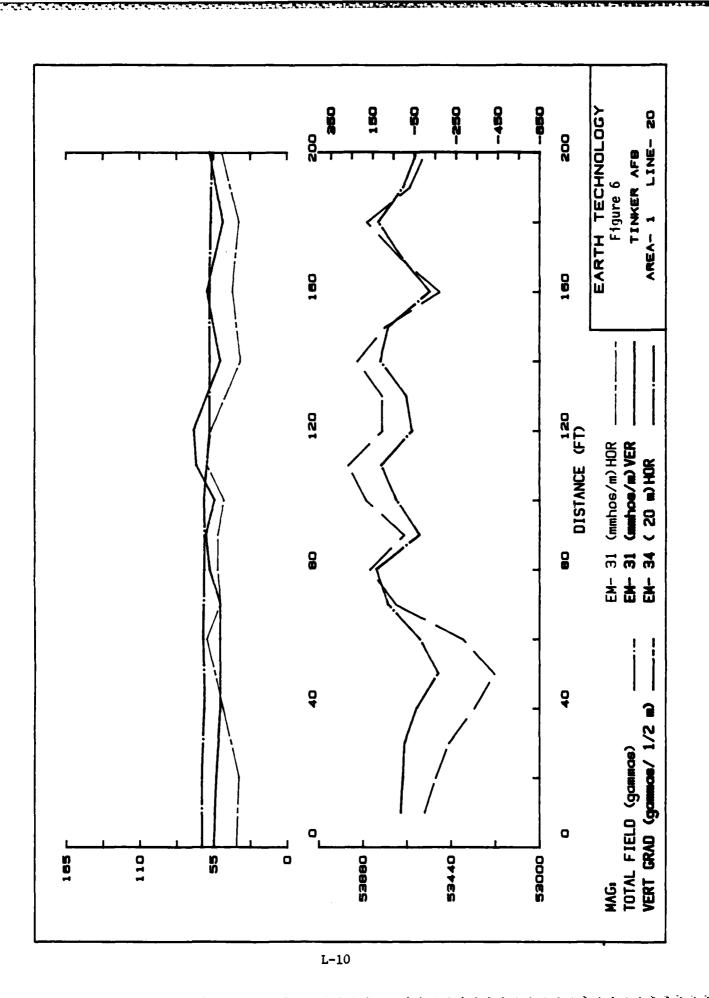


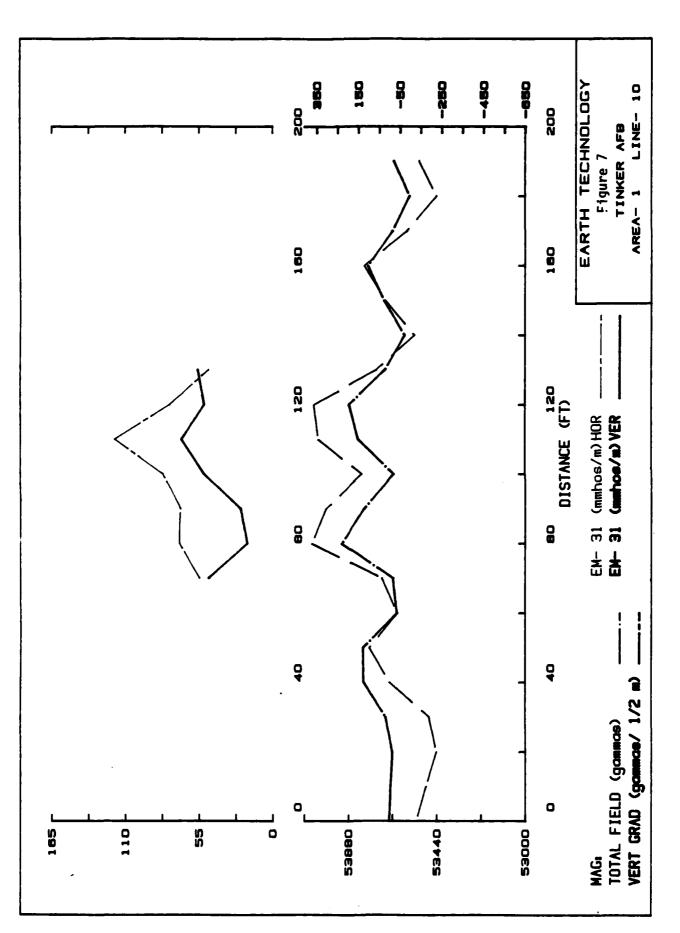


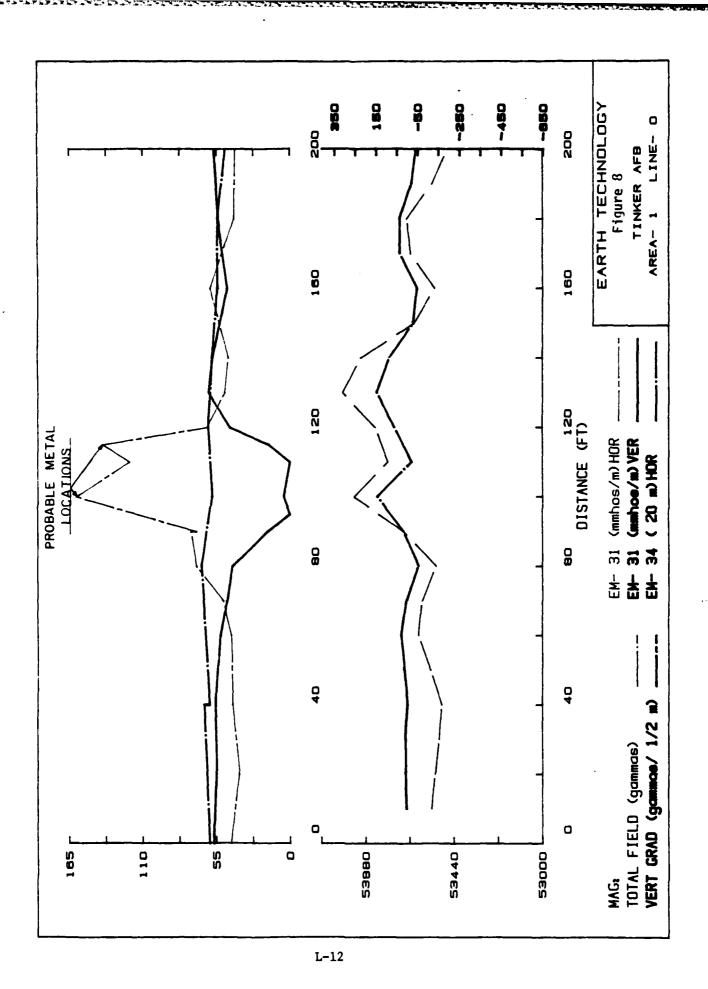


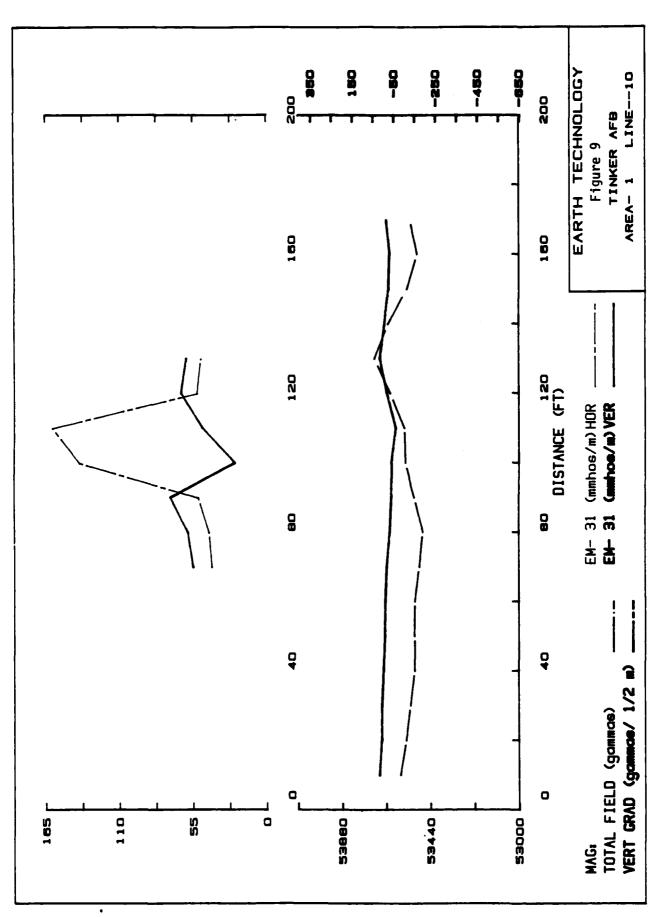


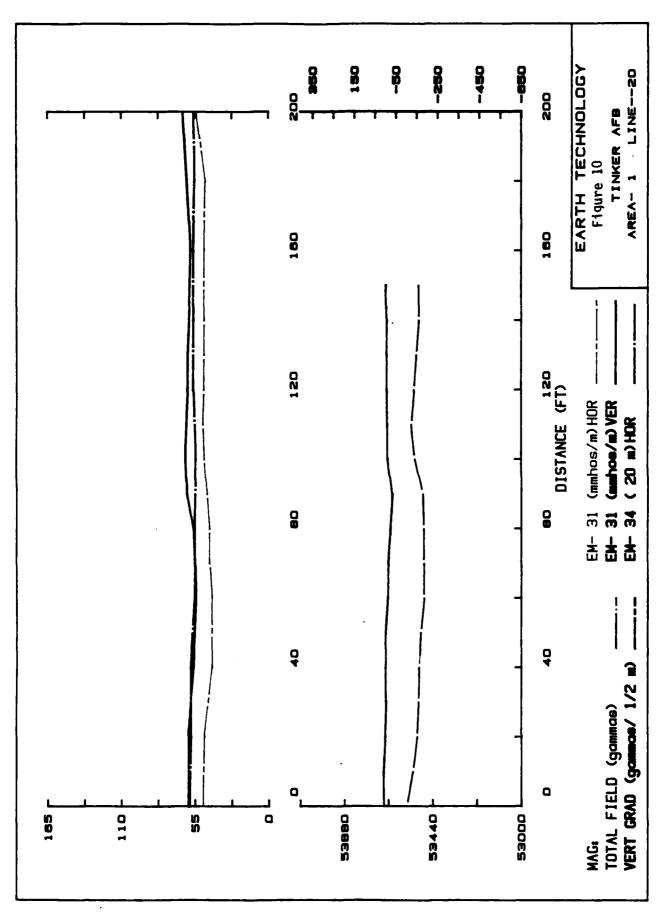


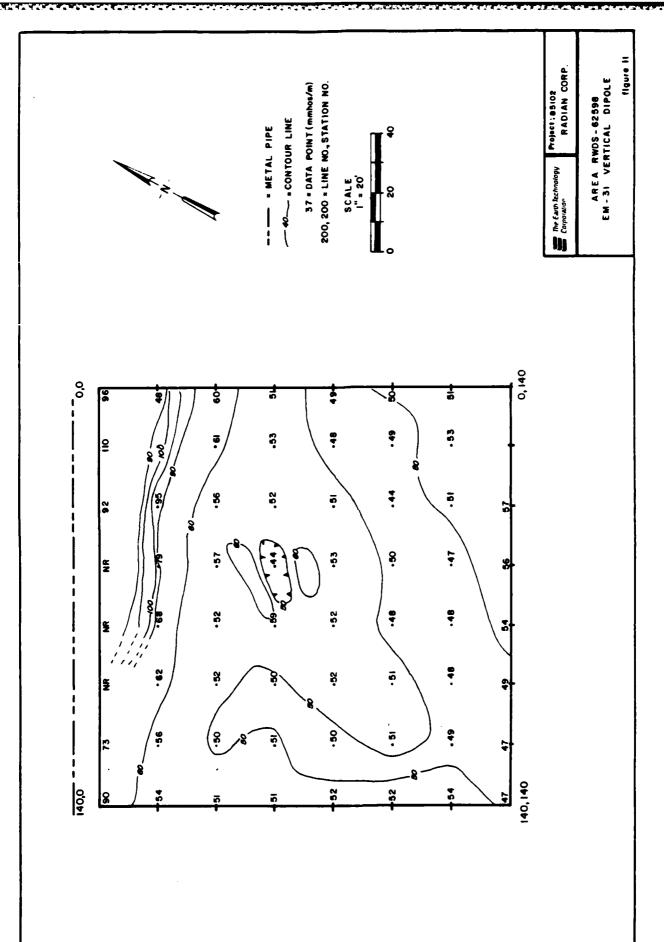


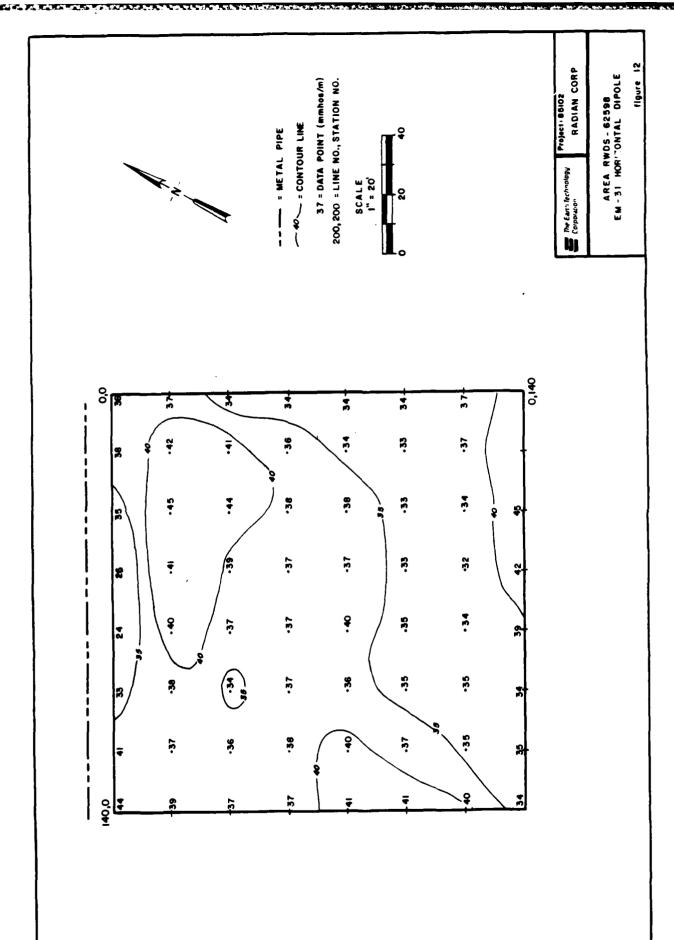


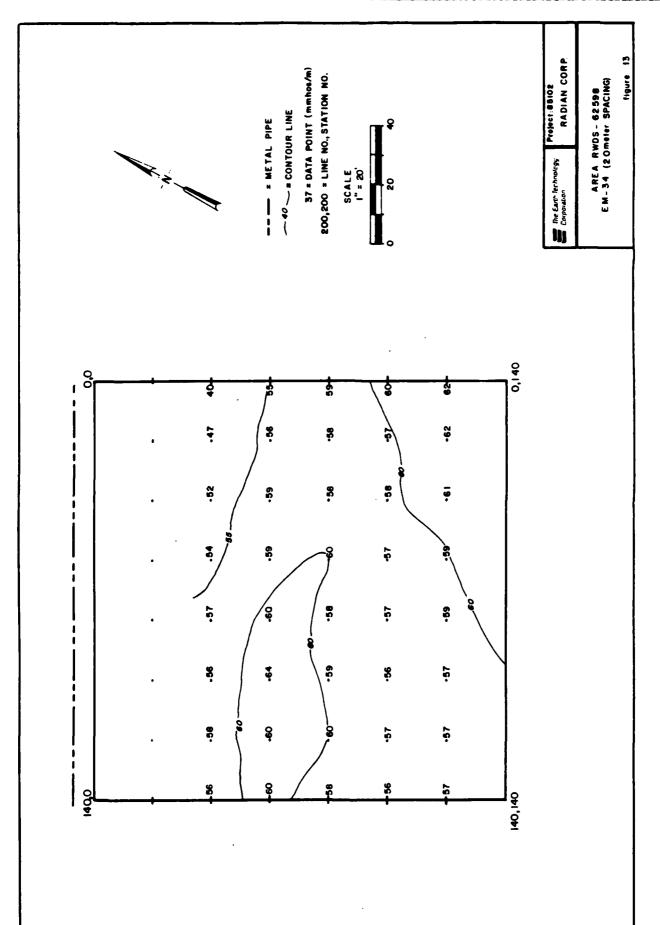




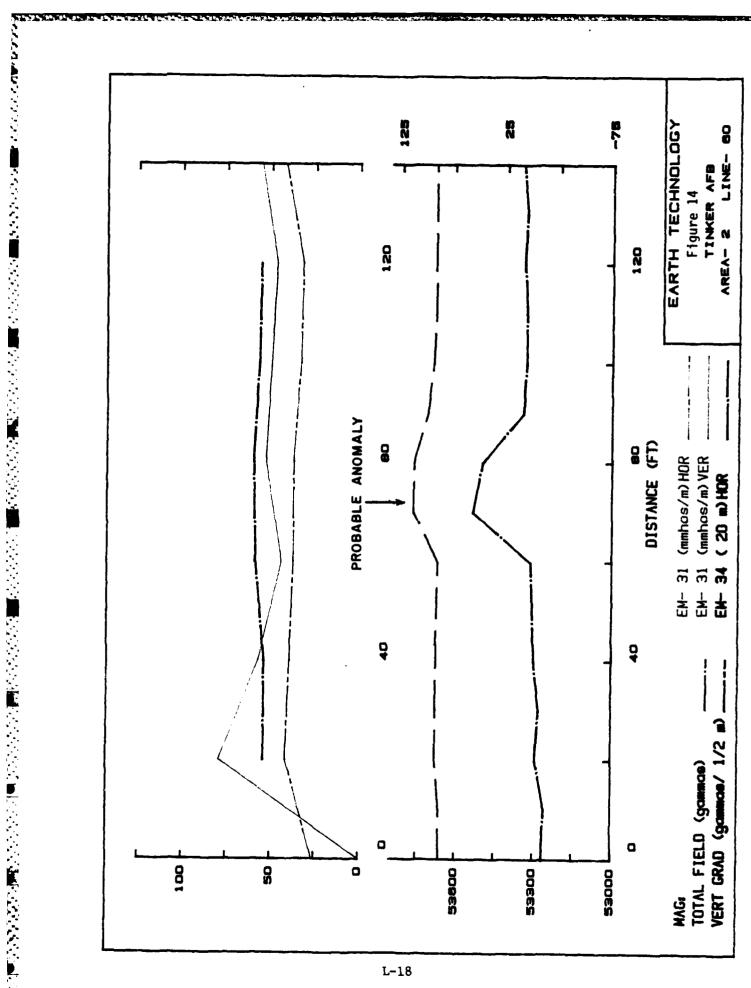




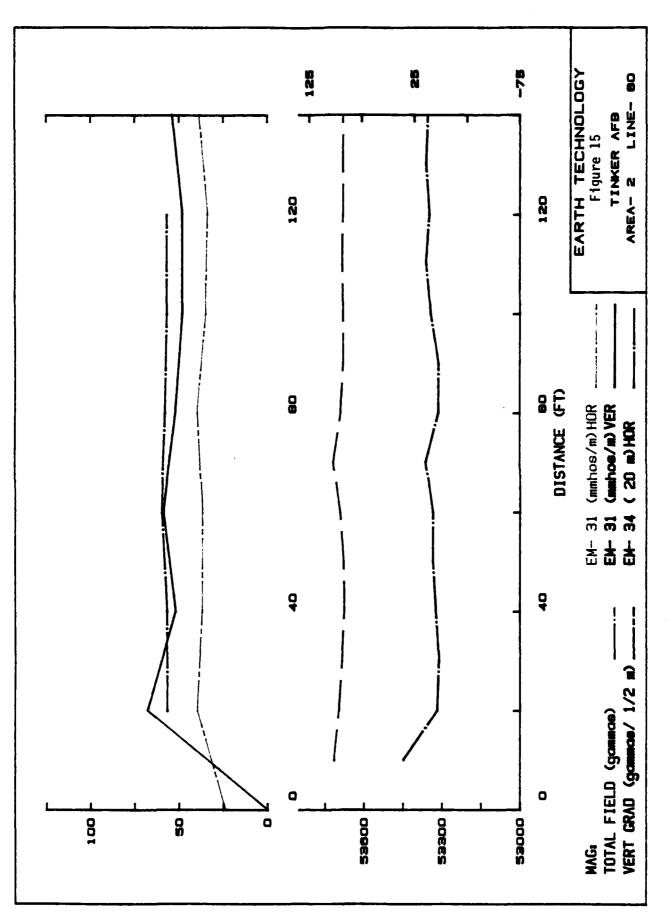


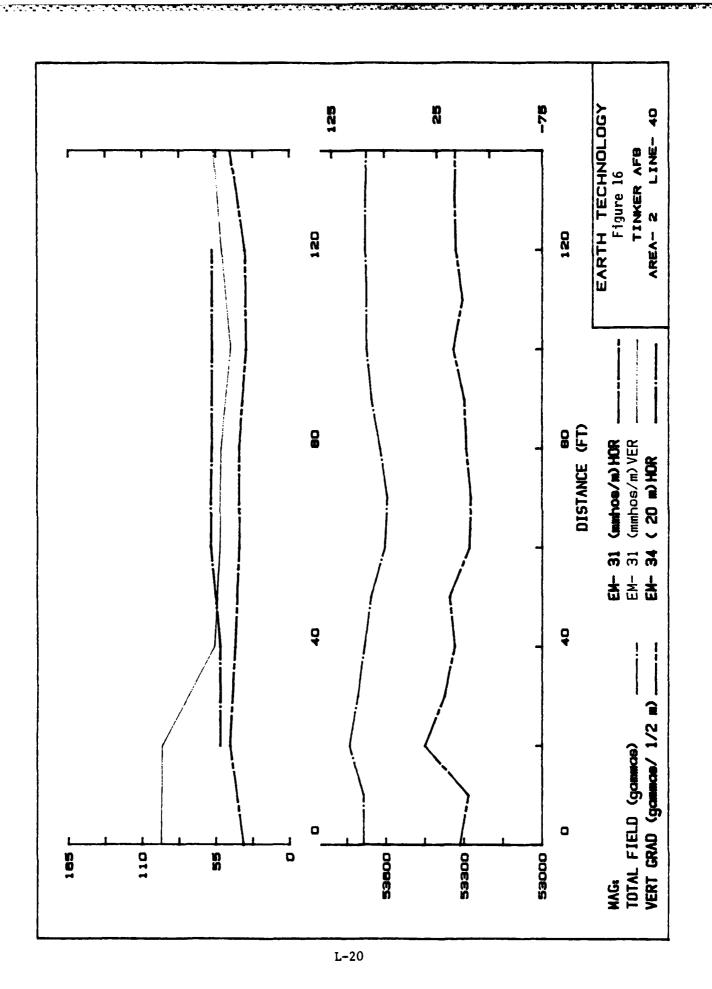


CONTRACTOR MANAGEMENT



General Administration of the Committee







APPENDIX M

Safety Plan Utilized on this Project

DCN 83-212-027-04-01

TINKER AFB IRP PHASE IIB SAFETY AND HEALTH PLAN

Prepared by: Fred B. Blood

25 October 1983

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1.0 PROJECT DESCRIPTION

The purpose of this project is to determine if environmental contamination has occurred from the waste disposal practices at Tinker AFB, OK. The project consists of a variety of field activities; the installation of wells and sample collection, analysis of samples, and reporting. This safety plan is to address the field activities.

The following activities are required in the field portion of the project:

- Installation of six deep sampling wells utilizing an air rotary drilling rig (open hole drilling prior to well casing installation). These wells are not situated directly over the waste site, but they may pass through contaminated ground water.
- Drilling of five soil borings utilizing a hollow-stem auger. These soil borings are directly over a waste site.
- Collection of 16 well water samples, six from the newly completed deep wells, eight from existing shallow ground water wells, and two from the soil boring holes.
- o Collection of 30 soil samples from the soil boring holes.
- o Collection of five leachate samples from existing seeps.

- o Collection of four water samples from an existing recreational impoundment.
- o Performance of surface geophysical testing.

There exists a reasonable probability that all of these activities, with the exception of the geophysical testing, will result in contact with waste contaminated materials. The waste materials include pesticide containers, a wide variety of solvents (including trichloroethylene), metal plating wastes, fuels and oils and radioactive wastes. It is considered highly improbable that radioactivity will be encountered in any samples except the impoundment water samples, and there in low to background levels.

2.0 RATIONALE OF SAFETY APPROACH

The Supervising Geologist is responsible for the proper execution of the safety plan described herein which is for the prevention of deleterious exposure to hazards associated with the handling of toxic wastes. Additionally, typical safety practices related to drilling activities must also be observed (use of safety hats, shoes, and life vests in boat use, etc.). These safety and health practices are to be observed by all Radian personnel and subcontractor personnel.

The potential for worker exposure to fumes and vapors requires gas-proof eye protection. This is accomplished by using full-face respirators. Respiratory protection must include organic vapor, acid gas, and fume protection. The expected concentrations should be within the capacity of air purifying respirator protection. Ambient air monitoring will be performed to provide an indication of excessive levels, which will then require increased protections. The collection of and working with aqueous samples requires splash protection, to be provided by coveralls and jackets. The handling of samples that may contain a wide range of solvents, including trichloroethylene, requires two-layer hand protection.

This safety program is established as a minimum requirement. Variations from the program for greater protection will not be discouraged. However, decreasing the protection must be authorized by the Supervising Geologist or the Project Director. Program changes will be documented in the after-action report.

3.0 SAFETY TRAINING

Prior to the initiation of site activities, a training session will be held to discuss the proposed work, associated safety and health plans, and emergency response plans. All personnel assigned to drilling activities and water sampling efforts will be instructed regarding the potential health and safety hazards associated with the work and protective measures available. Specifically, the following topics will be covered in the training session:

- o Potential routes of contact with toxic and/or corrosive substances
 - skin contact/adsorption
 - eye contact
 - inhalation
 - ingestion
- o Types, proper use, limitations and maintenance of applicable protective clothing and equipment
 - safety helmet
 - industrial safety glasses
 - chemical goggles
 - chemical resistant gloves
 - chemical resistant safety-toe boots
 - chemical resistant body coverings (apron, blouse, trousers, coveralls)
- Respiratory protection using half- and fullfacepiece air purifying respirator with replaceable filter cartridges
 - Hierarchy of protective controls: engineered, administrative, work practice, personal protective clothing and equipment.

- Forms of respiratory protection: air purifying (disposal/reusable), air supplied, self contained.
- Selection of respiratory protection based on hazard: dust, fume, mist, gas, irritant, warning properties.
- NIOSH certification/approval of respiratory protection equipment.
- Medical/physical/physiological fitness to wear respiratory protection (e.g., spirometry, clean shaven, etc.).
- Reevaluation of respirator selection.
- Use, limitations and maintenance of full-facepiece air-purifying respirator: qualitative fit test, routine inspection, replacement of parts, cleaning/disinfection, storage.
- Use, limitations and maintenance of half-facepiece air-purifying respirator: qualitative fit test, routine inspection, replacement of parts, cleaning/disinfection, storage.
- o Reporting of accidents and availability of medical assistance.

4.0 PROTECTIVE CLOTHING AND EQUIPMENT

All monitoring well installation work will be performed by persons wearing the following required personal protective equipment:

- o PVC bib overalls
- o PVC jacket
- o Gauntlet style, chemical resistant, Viton gloves over butyl rubber gloves
- o Chemical resistant safety toe, steel shank boots
- o Respirator (full-facepiece air purifying)
- o Safety helmet

Depending on site conditions and drilling conditions, other items may be used for supplemental protection. Such items may include:

- o Tyvek® coveralls
- o Chemical resistant apron
- o Respirator (half-facepiece, air purifying)
- o Chemical eye goggles or safety spectacles with side shields

Because of the potential for migration of contaminants into and through the shallow aquifer zone, well-defined disposal site boundaries are uncertain. Several disposal sites have a high potential for migration of contaminants. Most of the monitoring wells will be installed in areas hydraulically down-gradient of known disposal sites or in areas of unknown ground water flow direction. Since the degree of contamination and potential migration patterns of contaminants are not known, respirator use will be required as a precaution during all drilling activities and well installation work. Full-facepiece air purifying

respirators will be used with Ultra-Twin GMC Cartridges for acid gases, dust and fume protection, and organic vapors. The Supervising Geologist may decide to implement the use of half-face-piece, air purifying respirators depending on specific site and drilling conditions. Only when well installation work is being performed in areas hydraulically up-gradient of respective sites and when there is considerable confidence that well locations are outside zones of possible cross-contamination, may respirator use be discontinued.

5.0 WORK ZONES AND DECONTAMINATION PROCEDURES

To minimize the transfer of hazardous substance(s) from the site, contamination control procedures are needed. Contaminants must be removed from people and equipment prior to relocation from a work zone.

5.1 Work Zones

Prevention of exposures and spread of contamination will be controlled through the establishment of work zones. Two primary work zones will be utilized and will be referred to as the (1) Exclusion Zone and (2) Decontamination Zone.

The Exclusion Zone is the area where disturbance activities are conducted and where contaminants are or may be present. Only those properly trained individuals attired in the specific protective clothing and equipment will be allowed to enter and work in this zone.

The Decontamination Zone is the area where personnel and equipment will be decontaminated before moving to the next site.

The Exclusion Zone will comprise a 25-foot radius circle around the monitoring well and the Decontamination Zone will comprise a 25-foot wide ring around the Exclusion Zone as shown in Figure 5-1.

5.2 <u>Decontamination Procedures</u>

Personal protective equipment and drilling/sampling equipment can become contaminated in a number of ways including:

Exclusion Zone

| Decontamination Zone | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Decontamination | Deconta

Figure 5-1. Monitoring Well Work Zone.

- Contacting vapors, gases, mists, or particulates in the air.
- Walking through puddles of liquids or on contaminated soil.
- Using contaminated instruments or equipment.

Protective clothing and respirators help prevent the wearer from becoming contaminated or inhaling contaminants, while good work practices help reduce contamination of protective clothing, instruments, and equipment. Even with these safeguards, contamination may occur. Harmful materials can be transferred into clean areas, exposing unprotected personnel. Or in removing contaminated clothing, personnel may contact contaminants on the clothing and/or inhale them.

Decontamination consists of physically removing contaminants. How extensive decontamination must be depends on a number of factors, the most important being the type of contaminants involved. The more harmful the contaminant, the more extensive and thorough the decontamination must be. Combining decontamination, the correct method of doffing personnel protective equipment, and the use of site work zones minimizes cross-contamination from protective clothing to wearer, equipment to personnel, and one area to another.

Decontamination at the monitoring wells will be accomplished by physically removing contaminants from the surfaces of personal protective equipment and drilling/sampling equipment with detergent water followed by rinse with clean water. The process will be repeated (see Figure 5-2).

Final	rinse	of	dri	lling,
sampli	ing equ	ipp	ment	with
clean	water			

Rewash drilling/ sampling equipment with detergent water

Rinse drilling/ sampling equipment with clean water

Wash drilling/ sampling equipment with detergent water Decontamination Zone

Wash exposed skin surfaces

Remove respirators and gloves

Final rinse of PPE with clean water

Rewash PPE with detergent water

Rinse PPE with clean water

Wash PPE with detergent water

Monitoring Well



Exclusion Zone

Figure 5-2. Monitoring Well Decontamination Procedures.

6.0 SAFETY MONITORING

In addition to the use of personal protective equipment and respirator protection, safety support plans are also necessary. At Tinker AFB, safety support will constitute ambient air monitoring of hazardous and/or toxic materials for the protection of Radian and Air Force personnel and emergency response in the event of an employee injury or other medical emergency.

6.1 Ambient Air Monitoring

Ambient air monitoring will be performed using two techniques. One technique will use the combustible gas meter (TLV Sniffer) and the other will use colorimetric indicator tubes and the grabsampling method. All readings must be documented (minimum 2/hole) in field notes.

Air monitoring will be performed during drilling activities to determine if the respiratory protection chosen affords adequate protection from contaminant concentrations found on-site.

6.1.1 TLV Sniffer

A Bacharach Instruments TLV Sniffer will be used to locate on-site organic vapor concentrations that are higher than ambient outdoor air concentrations. The instrument will be used to determine general areas of elevated organic vapor concentrations, and not as a precision analytical instrument. It is an instantaneous measuring instrument and displays concentrations on a meter in parts per million (ppm), referenced to hexane.

The TLV Sniffer displays a meter reading directly in parts per million (ppm) volatile flammable vapor allowing an estimate of combustible gas concentrations. The instrument can be calibrated to read directly in parts per million for any one of many kinds of combustible gases. Factory calibration is for hexane unless otherwise specified, though readings from other gases and vapors may be interpreted easily by means of reading conversion curves (Figure 6-1).

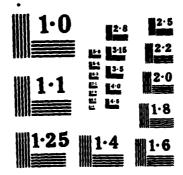
6.1.2 Grab-Sampling Using Colorimetric Indicator Tubes

A Draeger® kit with an assortment of indicator tubes will be used to obtain quick analysis of unknown hazardous substances in air. The Draeger® tubes are colorimetric direct reading detector tubes and function as "real time" hazardous condition indicators. Samples will be collected during drilling activities. An initial screening tube (Polytest®) will be used for a general qualitative test. This tube will give a positive reaction indicating the presence of ethyl acetate, benzene, acetone, alcohol, and/or hydrocarbons. If a positive reaction does occur, more specific tests may be made using more specifically reacting Draeger® tubes. Table 6-1 lists the sampling strategy to be used when obtaining grab-samples via Draeger® tubes at Tinker AFB. In addition to the Polytest®, any of the detector tubes listed in Table 6-1 may be used individually if the presence of that compound is suspected.

The respirators selected for use at Tinker AFB have been assigned protection factors by the National Institute for Occupational Safety and Health (NIOSH). These respirator protection factors are listed in Table 6-2. In event that sampling results indicate that the respective Threshold Limit Values (TLVs) may be exceeded, concentrations should be compared to the Protection

INSTALLATION RESTORATION PROGRAM PHASE II
CONFIRMATION/QUANTIFICATION STA. (U) RADIAN CORP AUSTIN
TX R M BAUER ET AL. OCT 85 RAD-85-212-027-21-03-VOL-2
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NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

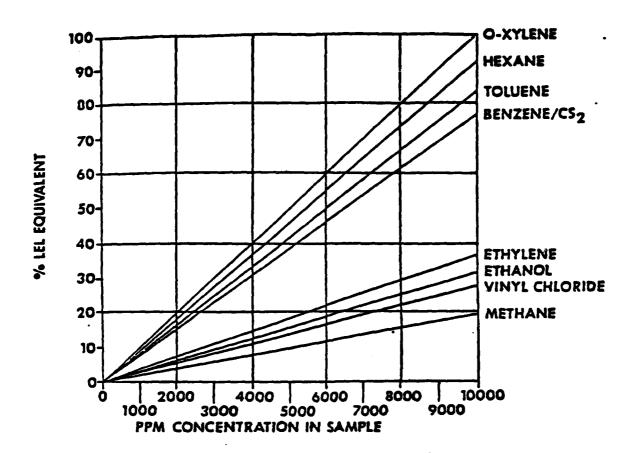


Figure 6-1. Conversion Curves Showing Relationship of PPM Concentrations of Various Gases to Percent L.E.L. Equivalents.

TABLE 6-1. DETECTOR TUBES FOR AMBIENT AIR MONITORING

reserve resultation assistant account of the resultation of the second of

Folytest 2, 3, 4, 5, 6* 50 ppm (benzene) Ethyl acetate 200/a Esters, 3, 4, 5 200 ppm (acetone) Benzene 0.05 Aromatic H/C 15 ppm Acetone 100/b Ketones 100 ppm Alcohol 100/a Alcohols 100 ppm Hydrocarbon 0.1%/b Aliphatic H/C 0.1% (butane) Sulfur dioxide 1/a Sulfur dioxide 1 ppm Hydrogen sulfide 1/c Hydrogen sulfide 1 ppm		Detector Tube ¹	Positive Reaction Indicates Presence of	Detection Limit	TLV (ACGIH 1982)	MUC ²
Esters, 3, 4, 5 20 Aromatic H/C 1 Ketones Alcohols Aliphatic H/C Sulfur dioxide Hydrogen sulfide		Polytest	2, 3, 4, 5, 6*	wdd wdd		
Aromatic H/C 1 Ketones Alcohols Aliphatic H/C Sulfur dioxide Hydrogen sulfide		Ethyl acetate 200/a	Esters, 3, 4, 5	200 ppm	400 ppm	1000 ppm
Ketones Alcohols Aliphatic H/C Sulfur dioxide Hydrogen sulfide	•	Benzene 0.05	Aromatic H/C	15 ppm	ndd 01	500 ppm
Alcohols Aliphatic H/C Sulfur dioxide Hydrogen sulfide		Acetone 100/b	Ketones	100 ppm	750 ppm	1000 ррш
Aliphatic H/C Sulfur dioxide Hydrogen sulfide	•	Alcohol 100/a	Alcohols	100 ppm		
Sulfur dioxide Hydrogen sulfide	•	Hydrocarbon 0.1%/b	Aliphatic H/C	0.1% (butane)		
Hydrogen sulfide		Sulfur dioxide 1/a	Sulfur dioxide	l ppm	2 ppm	100 ррш
	•	Hydrogen sulfide 1/c	Hydrogen sulfide	1 ppm	10 ppm	500 ppm

list is a modification of the sampling strategy for unknown substances developed by National Draeger, Inc. Tubes are manufactured by National Draeger, Inc.

² MUC - Maximum Use Concentration based on full-faced respirators. If levels exceed this value, respiratory protection must be increased.

A positive test also occurs for arsin, carbon disulfide, nitric oxide, carbon monozide, and methyl bromide.

TABLE 6-2. RESPIRATOR PROTECTION FACTORS

Type Respirator	Facepiece Pressure	Protection Factor
Half- or Quarter-mask, High-Efficiency Air Purifying	negative	10*
Full Facepiece, High Efficiency Air Purifying	negative	50*

^{*} These Protection Factors pertain to properly fitted facepieces with new cartridges and filters.

Factor associated with the particular respirator in use. If the concentrations of contaminants are not conservatively within the listed Protection Factor, work activities will be terminated until satisfactory respiratory protection can be obtained.

6.2 Personal/Site Hygiene

COCCOCC COCCOCC

Punctured, internally contaminated, cracked, stubbornly soiled, protective items will be disposed in sealed plastic bags.

Paper, rags, and other disposables used on-site or in equipment/sample container clean up will be disposed of in sealed plastic bags.

No food will be consumed on the exploration site. Employees will thoroughly wash their hands, forearms and face before consuming food or beverages other than water held in disposal cups. Drinking water will be available at the perimeter of the site being investigated. Disposable cups will be used to consume water after protective gauntlet gloves are removed.

Soil cuttings from augering which display contamination will be removed from the site in suitable sealed containers for eventual disposal.

6.3 Emergency Medical Services

In the event of an employee injury or other medical emergency on-site, the Supervising Geologist and other personnel trained in first aid and CPR will immediately provide assistance. An MSA model self-contained breathing apparatus (SCBA) will be nearby for use by the Supervising Geologist and back-up geologist during emergency rescue situations requiring respiratory protection.

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